Prep. [1] - First Term – Algebra – Unit [1] - Rational Numbers

Lesson [1] : Set Of Rational Numbers

Remember :

- You studied in the primary stage some sets of numbers as :
  - * Set of counting numbers $= \{1, 2, 3, 4, ...\}$
  - * Set of natural numbers $\mathbb{N} = \{0, 1, 2, 3, 4, ...\}$
  - * Set of integers $\mathbb{Z} = \{..., -3, -2, -1, 0, 1, 2, 3, ...\}$
- In this unit, you will recognize another set of numbers is called "The set of rational numbers" and it is denoted by the symbol $\mathbb{Q}$

Rational Numbers :

The numbers : $\frac{1}{2}$, $-\frac{5}{8}$, 3, 0, $3\frac{1}{2}$, 0.7, 2.5 and 15% are rational numbers.

The set of rational numbers $\mathbb{Q} = \{X : X = \frac{a}{b}, a \in \mathbb{Z}, b \in \mathbb{Z}, b \neq 0\}$

Based on the previous defintion, we can say that :

1 **All the decimal numbers are rational numbers.**

2 **All percents are rational numbers.**

3 **All integers are rational numbers.**

Therefore : The set of integers is a subset of the set of rational numbers.

i.e. $\mathbb{Z} \subset \mathbb{Q}$

and since $\mathbb{N} \subset \mathbb{Z}$ then $\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q}$

and the opposite diagram shows that.

Remarks

Each integer is a rational number, but not each rational number is an integer.

If $\frac{a}{b}$ is a rational number, then $b \neq 0$

If the rational number $\frac{a}{b} = 0$, then $a = 0$

The rational number $\frac{a}{b}$ can be written in the form of another rational number $\frac{c}{d}$ equal to it by applying the following property :

The value of the rational number $\frac{a}{b}$ does not change if its two terms are multiplied or divided by an integer $\neq$ zero.

Terminated Decimal		Recurring Decimal	
$\frac{1}{2} = 0.5$	$\frac{2}{5} = 0.4$	$\frac{1}{3} = 0.33333333333 = 0.\dot{3}$	$\frac{13}{33} = 0.3939393939 = 0.\dot{3}\dot{9}$
$\frac{1}{4} = 0.25$	$\frac{3}{8} = 0.375$	$\frac{2}{3} = 0.66666666666 = 0.\dot{6}$	$\frac{17}{33} = 0.5151515151 = 0.\dot{5}\dot{1}$
$\frac{3}{4} = 0.75$	$\frac{5}{8} = 0.625$	$\frac{5}{9} = 0.55555555555 = 0.\dot{5}$	$\frac{19}{33} = 0.5757575757 = 0.\dot{5}\dot{7}$

Lesson [3] : Adding And Subtracting Rational Numbers

Properties of the addition operation in $\mathbb{Q}$

1 Closure property :

The sum of any two rational numbers is a rational number.

i.e. $\mathbb{Q}$ is closed under addition operation.

2 Commutative property :

If a and b are two rational numbers , then a + b = b + a

3 Associative property :

If a , b and c are three rational numbers , then
(a + b) + c = a + (b + c)

4 The existence of identity element (Neutral element) property in addition :

Then we say : zero is the identity element in addition operation in $\mathbb{Q}$

5 The existence of additive inverse property :

For every rational number a there exist an additive inverse to it that is – a

where a + (– a) = zero (the identity element in addition)

For example:

The additive inverse of the number $\frac{3}{4}$ is $-\frac{3}{4}$

and vice versa the additive inverse of $-\frac{3}{4}$ is $\frac{3}{4}$

because $\frac{3}{4} + \left(-\frac{3}{4}\right) = \left(-\frac{3}{4}\right) + \frac{3}{4}$ = zero (the identity element in addition).

— **Notice that :** —

Zero is its own additive inverse.

Second : Subtraction operation

Since each rational number has an additive inverse , then the subtraction operation is always possible in $\mathbb{Q}$ and it is defined as follows :

Definition :

If a and b are two rational numbers , then $a - b = a + (- b)$

Remarks

- $\mathbb{Q}$ is closed under subtraction operation i.e. the result of subtracting any two rational numbers is a rational number.
- The subtraction operation in $\mathbb{Q}$ is not commutative and not associative.
- There is no identity element with respect to subtraction in $\mathbb{Q}$ and hence there is no inverses for the numbers with respect to subtraction in $\mathbb{Q}$

Lesson [4] : Multiplying And Dividing Rational Numbers

Properties of the set of rational numbers under multiplication

1 Closure property :

The product of any two rational numbers is a rational number.

i.e. $\mathbb{Q}$ is closed under multiplication operation.

2 Commutative property :

If a and b are two rational numbers , then : $a \times b = b \times a$

3 Associative property :

If a , b and c are three rational numbers , then : $(a \times b) \times c = a \times (b \times c)$

4 The existence of multiplicative identity (neutral) element property :

Then we say : the number 1 is the multiplicative identity (neutral) in $\mathbb{Q}$

5 The existence of multiplicative inverse of the rational number property :

For every rational number $\dfrac{a}{b}$ except zero there is a multiplicative inverse that is the rational number $\dfrac{b}{a}$ where $\dfrac{a}{b} \times \dfrac{b}{a} = 1$ (the multiplicative identity)

For example: • The multiplicative inverse of the number $\dfrac{3}{2}$ is $\dfrac{2}{3}$

and vice versa the multiplicative inverse of $\dfrac{2}{3}$ is $\dfrac{3}{2}$

Remarks

- The multiplicative inverse of the rational number is called the reciprocal of the rational number.
- Zero has no multiplicative inverse because : $\frac{1}{zero}$ is meaningless **i.e.** (undefined)
- The multiplicative inverse of the number 1 is itself and the multiplicative inverse of the number – 1 is itself also.
- Multiplying any rational number by zero equals zero.

  For example: $0 \times \frac{1}{2} = 0$, $-\frac{5}{8} \times 0 = 0$

6 Property of distributing multiplication over addition and subtraction :

If a , b and c are three rational numbers , then :

1 $a \times (b + c) = a \times b + a \times c$, $(b + c) \times a = b \times a + c \times a$

i.e. Multiplication is distributed over addition in $\mathbb{Q}$ from right and from left.

2 $a \times (b - c) = a \times b - a \times c$, $(b - c) \times a = b \times a - c \times a$

i.e. Multiplication is distributed over subtraction in $\mathbb{Q}$ from right and from left.

Second : Division operation

Since every rational number (except zero) has a multiplicative inverse , then we can define the division operation in $\mathbb{Q}$ as follows :

Definition :

If $\frac{a}{b}$, $\frac{c}{d}$ are two rational numbers , $\frac{c}{d} \neq zero$, then $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$

- Since division by zero is impossible in $\mathbb{Q}$, therefore $\mathbb{Q}$ is not closed with respect to division operation.
- Division operation in $\mathbb{Q}$ is not commutative and not associative.
- There is no identity element in division operation in $\mathbb{Q}$ and hence there are no inverses numbers with respect to division operation in $\mathbb{Q}$

Lesson [5] : Applications On The Rational Numbers

The Distance Between Two Numbers :

Distance between number X and Number Y = | X – Y | or | Y – X | where | X – Y | = | Y – X |

For Example :

Distance between 5 and 2 = | 5 – 2 | or | 2 – 5 | = 3 Units

The Number That Lies Halfway :

The Number That Lies Halfway = (Fist number + Second Number) ÷ 2

For Example :

The Number That Lies Halfway = ($\frac{1}{2} + \frac{4}{5}$) ÷ 2 = $\frac{13}{20}$

The Number That Lies Third Of The Way :

Third from smaller = smaller + $\frac{1}{3}$ | smaller – greater |

Third from greater = greater – $\frac{1}{3}$ | smaller – greater |

The Number That Lies Fourth Of The Way :

Third from smaller = smaller + $\frac{1}{4}$ | smaller – greater |

Third from greater = greater – $\frac{1}{4}$ | smaller – greater |

The Number That Lies Fifth Of The Way :

Third from smaller = smaller + $\frac{1}{5}$ | smaller – greater |

Third from greater = greater – $\frac{1}{5}$ | smaller – greater |

Prep. [1] - First Term – Algebra – Unit [2] - Algebra

Lesson [1] : Algebraic Terms And Algebraic Expressions

Introduction : Variable And Constant :

A variable is a letter as : X or y or n or . . . .which represents any number in a specifies set of numbers.

A constant is a number or letter represents only one number

Algebraic Term (mononomial) :

The algebraic term is formed from the product of two or more factors.

📖 The degree of the algebraic term:

It is the sum of the indices of the algebraic factors in this term٠

Algebraic Expression :

The algebraic expression consists of an algebraic term (monomial) or more .

📖 The Degree Of The Algebraic Expression:

It is the highest degree of the terms forming it.

Absolute Term :

The algebraic term that has no algebraic factors is called the absolute term as the term (- 1) in the expression : $X^3 - 1$

Remarks

Any number is an algebraic term of zero degree.

Solutions

12 ① Third , 3   ② $\frac{1}{2}$, sixth ③ 1 , first   ④ zero   ⑤ -8 , zero   ⑥ second   ⑦ 3 , second

Lesson [2] : Like algebraic terms

The algebraic terms are said to be like if the algebraic symbols forming their factors are like and the indices of these symbols are equal.

Adding and subtracting like terms

Adding or subtracting operation performs as the following :

1 Add or subtract the numerical coefficients.

2 Use the sum or the difference as the coefficient of the result algebraic term.

Prep. [1] - First Term – Algebra – Unit [3] - Statistics

Lesson [2] : The Mode

Definition :

The mode of a set of values is the most common value.

Example 1

Find the mode of each of the following :

1 5 , 8 , 7 , 5 , 6 , 8 , 5   **2** 22 , 2 , 7 , 22 , 7 , 7

Solution

1 The most common value (the most frequent) is 5   , then the mode = 5

2 The most common value (the most frequent) is 7   , then the mode = 7

Lesson [3] : The Median

Definition :

The median of a set of values is the value which divides this set such that the number of values which are greater than it is equal to the number of values which are less than it.

To get the median do as follows :

Arrange the values ascendingly or descendingly

then

If the number of values is odd, then : The median is the value which is in the middle exactly.	If the number of values is even, then : The median $$= \frac{\text{The sum of two middle values}}{2}$$
For example: ● **If the values are :** 42 , 23 , 17 , 30 , 20 Then its ascending order is : 17 , 20 , 23 , 30 , 42 the median = 23	**For example:** ● **If the values are :** 27 , 13 , 23 , 24 , 13 , 21 Then its ascending order is : 13 , 13 , 21 , 23 , 24 , 27 the median $= \frac{21 + 23}{2} = 22$

Remarks

$$\text{Order of median} = \frac{\text{number of values} + 1}{2}$$

For Example : -

If the number of values is : 13 then the order of median = $\frac{13+1}{2}$ = 7

If the number of values is : 7 then the order of median = $\frac{7+1}{2}$ = 4

If the order of median = 5 , then the number of values = 5 × 2 – 1 = 9

If the order of median = 4 , then the number of values = 4 × 2 – 1 = 7

If the order of median = 8 , then the number of values = 8 × 2 – 1 = 15

Lesson [4] : The Mean

Definition :

- The mean of a set of values = $\dfrac{\text{Sum of these values}}{\text{Number of these values}}$

Example 1

If the marks of 6 students in an examination are : 25 , 16 , 47 , 28 , 45 and 49

Calculate the mean of these marks.

Solution

The mean = $\dfrac{\text{Sum of marks}}{\text{Number of students}} = \dfrac{25 + 16 + 47 + 28 + 45 + 49}{6} = \dfrac{210}{6} = 35$ marks

We notice that : If each student obtained 35 marks , then the sum of marks is the same sum of the original marks.

Example 2

If the mean of the values : 5 , 7 , X and 9 is 6 **Find the value of X**

Solution

Since the mean = $\dfrac{\text{Sum of values}}{\text{Number of values}}$

Then $6 = \dfrac{5 + 7 + X + 9}{4}$, then $6 = \dfrac{21 + X}{4}$, then $X = 3$

Important remark

The rational number that lying at the middle of the distance between any two rational numbers = the mean of the two numbers.

For example:

The rational number that lies at the middle of the distance between $\dfrac{1}{2}$ and $\dfrac{3}{5}$

$= \left(\dfrac{1}{2} + \dfrac{3}{5} \right) \div 2 = \left(\dfrac{5}{10} + \dfrac{6}{10} \right) \div 2 = \dfrac{11}{10} \times \dfrac{1}{2} = \dfrac{11}{20}$

Exercises

Quiz	A	Date :	....	الاسـم
Mark	....	**15**	....	توقيع ولى الأمر

1 The number $\frac{X+7}{X-7} \in \mathbb{Q}$, if $X \neq$ ....

     A) 3   B) 4   C) 5   D) 7

2 If $\frac{X}{Y} = 1$, then $2X - 2Y =$ ....

     A) 1   B) 2   C) 0   D) 4

3 If $\frac{X-2}{X-5}$ is a rational number , then $X \neq$ ....

     A) 5   B) 6   C) 7   D) 8

4 If : $\frac{20}{X} = \frac{4}{5}$ then $X =$ ....

     A) 25   B) 4   C) 15   D) 45

5 The number $\frac{5}{X}$ is a rational, then $X \neq$ ....

     A) 1   B) 2   C) 3   D) zero

6 $0.5\ddot{7} =$ ....

     A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

7 The rational number $\frac{X+9}{X+5} = 0$, when $X =$ ....

     A) – 5   B) – 6   C) – 9   D) – 8

8 If $\frac{X}{Y} = 1$, then $5X - 5Y =$ ....

     A) 5   B) 0   C) 7   D) 9

9 If $\frac{X-2}{X-8}$ is a rational number , then $X \neq$ ....

     A) 5   B) 6   C) 7   D) 8

10 If : $\frac{2}{5} = \frac{X}{10}$ then $X =$ ....

     A) – 20   B) 4   C) 10   D) 15

11 The number $\frac{2}{X}$ is a rational, then $X \neq$ ....

     A) 1   B) 2   C) 3   D) zero

12 The number 0.7 = ... (in the rational form)

     A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

13 If $\frac{X-8}{X-9} = 0$, then the value of X is ....

     A) 5   B) 6   C) 7   D) 8

14 The necessary condition to make $\frac{X-1}{X+1}$ a rational number is $X \neq$ ....

     A) – 1   B) – 2   C) 3   D) 4

15 If $\frac{X}{Y} = 1$, then $8X - 8Y =$ ....

     A) 0   B) 6   C) 7   D) 9

Quiz	B	Date :	....	الاســـم
Mark		....	**16**	....	توقيع ولى الأمر

1 — The necessary condition to make $\frac{7}{X+5}$ a rational number is $X \neq$ ....

A) -3 B) -5 C) 3 D) 5

2 — If $\frac{X}{Y} = 1$, then $7X - 7Y =$ ....

A) 5 B) 6 C) 7 D) 0

3 — If $\frac{7}{3-X} \in \mathbb{Q}$, then $X \neq$ ....

A) 3 B) 4 C) 5 D) 7

4 — If : $\frac{X}{24} = \frac{5}{8}$ then $X =$ ....

A) -20 B) 4 C) 10 D) 15

5 — The number $\frac{4}{X}$ is a rational, then $X \neq$ ....

A) 1 B) 2 C) 3 D) zero

6 — $0.5\dot{1}\dot{} =$ ....

A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

7 — The rational number $\frac{X+8}{X+9} = 0$, when $X =$ ....

A) -5 B) -6 C) -7 D) -8

8 — $0.\dot{6} =$ ....

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

9 — If $\frac{X+3}{X+9} = 0$, then the value of X is ....

A) -1 B) -2 C) -3 D) -4

10 — The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$ ....

A) -1 B) -2 C) 3 D) 4

11 — If : $\frac{X}{36} = \frac{5}{12}$ then $X =$ ....

A) 25 B) 4 C) 15 D) 45

12 — If $\frac{X-3}{X-2}$ is a rational number , then $X \neq$ ....

A) 1 B) 2 C) 3 D) 4

13 — $0.\dot{1}\dot{8} =$ ....

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

14 — The rational number $\frac{X+5}{X+9} = 0$, when $X =$ ....

A) -5 B) -6 C) -7 D) -8

15 — If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then $X =$ ....

A) 2 B) 3 C) 7 D) 5

16 — The rational number $\frac{X-4}{X-9} = 0$, then $X =$ ....

A) 1 B) 2 C) 3 D) 4

Quiz C	Date :	....	الاسـم
Mark	....	**16**	....	توقيع ولى الأمر

1 If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then X = ...

    A) 2   B) 3   C) 4   D) 5

2 The rational number $\frac{X-3}{X-9} = 0$, then X = ...

    A) 1   B) 2   C) 3   D) 4

3 If $\frac{X+1}{X-5} \in \mathbb{Q}$, then $X \neq$ ....

    A) 3   B) 4   C) 5   D) 7

4 If $\frac{X}{Y} = 1$, then $X - Y$ = ...

    A) 1   B) 0   C) 3   D) 4

5 If $\frac{X-2}{X-4}$ is a rational number , then $X \neq$ ....

    A) 1   B) 2   C) 3   D) 4

6 $0.\dot{2}\dot{7}$ = ...

    A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

7 The rational number $\frac{X+7}{X+9} = 0$, when X = ...

    A) – 5   B) – 6   C) – 7   D) – 8

8 $0.\dot{3}$ = ...

    A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

9 If $\frac{X+2}{X+9} = 0$, then the value of X is ....

    A) – 1   B) – 2   C) – 3   D) – 4

10 The necessary condition to make $\frac{X+3}{X-3}$ a rational number is $X \neq$ ....

    A) – 1   B) – 2   C) 3   D) 4

11 The rational number $\frac{X-7}{X-9} = 0$, then X = ...

    A) 5   B) 6   C) 7   D) 9

12 The necessary condition to make $\frac{7}{X-5}$ a rational number is $X \neq$ ....

    A) – 3   B) – 5   C) 3   D) 5

13 If : $\frac{15}{X} = \frac{-3}{4}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

14 The number $\frac{1}{X}$ is a rational, then $X \neq$ ....

    A) 1   B) 2   C) 3   D) zero

15 The number 0.5 = ... (in the rational form)

    A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

16 If $\frac{X-9}{X-3} = 0$, then the value of X is ....

    A) 5   B) 6   C) 7   D) 9

| Quiz D | Date : .... | .... | الاسم |
| Mark | .... 16 | .... | توقيع ولى الأمر |

1 The number 0.3 = ... (in the rational form)

   A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

2 If $\frac{X-7}{5} = 0$, then the value of X is ....

   A) 5   B) 6   C) 7   D) 9

3 The necessary condition to make $\frac{7}{X+3}$ a rational number is X ≠

   A) – 3   B) – 5   C) 3   D) 5

4 If $\frac{X}{Y} = 1$, then 6 X – 6 Y = ...

   A) 5   B) 6   C) 0   D) 9

5 If $\frac{X-2}{X-9}$ is a rational number , then X ≠ ....

   A) 5   B) 6   C) 7   D) 9

6 If : $\frac{X}{24} = \frac{5}{12}$ then X = ...

   A) – 20   B) 4   C) 10   D) 15

7 The number $\frac{3}{X}$ is a rational, then X ≠ ....

   A) 1   B) 2   C) 3   D) zero

8 The number 0.9 = ... (in the rational form)

   A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

9 If $\frac{X+1}{X+9} = 0$, then the value of X is ....

   A) – 1   B) – 2   C) – 3   D) – 4

10 The necessary condition to make $\frac{X-2}{X+2}$ a rational number is X ≠ ....

   A) – 1   B) – 2   C) 3   D) 4

11 The rational number $\frac{X-6}{X-9} = 0$, then X = ...

   A) 5   B) 6   C) 7   D) 9

12 The necessary condition to make $\frac{7}{X-3}$ a rational number is X ≠ ....

   A) – 3   B) – 5   C) 3   D) 5

13 The rational number $\frac{X-1}{X-9} = 0$, then X = ...

   A) 1   B) 2   C) 3   D) 4

14 If $\frac{3}{X-5} \in \mathbb{Q}$, then X ≠ ....

   A) 3   B) 4   C) 5   D) 7

15 $0.1\dot{5} =$ ....

   A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

16 The rational number $\frac{X+4}{X+9} = 0$, when X = ...

   A) – 1   B) – 2   C) – 3   D) – 4

الاسـم	....	Date :	Quiz E
توقيع ولى الأمر	....	16	Mark ....

1 If $\frac{X}{Y} = 1$, then $3X - 3Y =$ ....

A) 1   B) 2   C) 3   D) 0

2 If $\frac{X-2}{X-6}$ is a rational number , then $X \neq$ ....

A) 5   B) 6   C) 7   D) 8

3 If : $\frac{2}{5} = \frac{X}{15}$ then $X =$ ....

A) 25   B) 6   C) 15   D) 45

4 If $\frac{X-2}{X-1}$ is a rational number , then $X \neq$ ....

A) 1   B) 2   C) 3   D) 4

5 The rational number $\frac{X-2}{X-9} = 0$, then $X =$ ....

A) 1   B) 2   C) 3   D) 4

6 If $\frac{X-1}{X-5} \in \mathbb{Q}$, then $X \neq$ ....

A) 3   B) 4   C) 5   D) 7

7 If : $\frac{X}{72} = \frac{5}{8}$ then $X =$ ....

A) 25   B) 4   C) 15   D) 45

8 If $\frac{X-2}{X-3}$ is a rational number , then $X \neq$ ....

A) 1   B) 2   C) 3   D) 4

9 $0.\overset{\cdot}{2}\overset{\cdot}{1} =$ ....

A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

10 The rational number $\frac{X+6}{X+9} = 0$, when $X =$ ....

A) -5 B) -6 C) -7 D) -8

11 If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then $X =$ ....

A) 2   B) 3   C) 4   D) 5

12 The rational number $\frac{X-5}{X-9} = 0$, then $X =$ ....

A) 5   B) 6   C) 7   D) 9

13 The number $\frac{X+7}{X-5} \in \mathbb{Q}$, if $X \neq$ ....

A) 3   B) 4   C) 5   D) 7

14 If $\frac{X}{Y} = 1$, then $9X - 9Y =$ ....

A) 5   B) 6   C) 0   D) 9

15 If $\frac{5}{X-4} \in \mathbb{Q}$, then $X \neq$ ....

A) 3   B) 4   C) 5   D) 7

16 If $\frac{X}{Y} = 1$, then $4X - 4Y =$ ....

A) 0   B) 2   C) 3   D) 4

Homework

Quiz	A	Date :	....	الاســم
Mark	....	**15**	....	توقيع ولى الأمر

1 If $\frac{X}{Y} = 1$, then $9X - 9Y =$ ....
   A) 5   B) 6   C) 0   D) 9

2 If $\frac{X-9}{X-3} = 0$, then the value of X is ....
   A) 5   B) 6   C) 7   D) 9

3 The rational number $\frac{X+8}{X+9} = 0$, when X = ...
   A) – 5   B) – 6   C) – 7   D) – 8

4 If $\frac{X-2}{X-3}$ is a rational number , then $X \neq$ ....
   A) 1   B) 2   C) 3   D) 4

5 If $\frac{5}{X-4} \in \mathbb{Q}$, then $X \neq$ ....
   A) 3   B) 4   C) 5   D) 7

6 The necessary condition to make $\frac{7}{X+5}$ a rational number is $X \neq$ ....
   A) – 3   B) – 5   C) 3   D) 5

7 The number 0.7 = ... (in the rational form)
   A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

8 $0.5\overset{..}{7}$ = ...
   A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

9 If $\frac{X}{Y} = 1$, then $X - Y =$ ....
   A) 1   B) 0   C) 3   D) 4

10 The rational number $\frac{X-1}{X-9} = 0$, then X = ...
   A) 1   B) 2   C) 3   D) 4

11 If $\frac{X-8}{X-9} = 0$, then the value of X is ....
   A) 5   B) 6   C) 7   D) 8

12 The rational number $\frac{X+9}{X+5} = 0$, when X = ...
   A) – 5   B) – 6   C) – 9   D) – 8

13 If $\frac{X-2}{X-4}$ is a rational number , then $X \neq$ ....
   A) 1   B) 2   C) 3   D) 4

14 If $\frac{3}{X-5} \in \mathbb{Q}$, then $X \neq$ ....
   A) 3   B) 4   C) 5   D) 7

15 The necessary condition to make $\frac{X-1}{X+1}$ a rational number is $X \neq$ ....
   A) – 1   B) – 2   C) 3   D) 4

Quiz B	Date :	....	الاســم
Mark	....	16	....	توقيع ولى الأمر

1 If $\frac{X-2}{X-7}$ is a rational number , then $X \neq$ ....

    A) 5   B) 6   C) 7   D) 8

2 $0.1\dot{8} =$ ....

    A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

3 If : $\frac{20}{X} = \frac{4}{5}$ then $X =$ ....

    A) 25   B) 4   C) 15   D) 45

4 If $\frac{X}{Y} = 1$, then $6X - 6Y =$ ....

    A) 5   B) 6   C) 0   D) 9

5 The rational number $\frac{X-6}{X-9} = 0$, then $X =$ ....

    A) 5   B) 6   C) 7   D) 9

6 The rational number $\frac{X+5}{X+9} = 0$, when $X =$ ....

    A) – 5   B) – 6   C) – 7   D) – 8

7 The number $\frac{5}{X}$ is a rational, then $X \neq$ ....

    A) 1   B) 2   C) 3   D) zero

8 If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$ ....

    A) 5   B) 6   C) 7   D) 9

9 The necessary condition to make $\frac{7}{X-3}$ a rational number is $X \neq$ ....

    A) – 3   B) – 5   C) 3   D) 5

10 If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then $X =$ ....

    A) 2   B) 3   C) 7   D) 5

11 If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$ ....

    A) 3   B) 4   C) 5   D) 7

12 $0.2\dot{1} =$ ....

    A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

13 If : $\frac{2}{5} = \frac{X}{15}$ then $X =$ ....

    A) 25   B) 6   C) 15   D) 45

14 If $\frac{X}{Y} = 1$, then $7X - 7Y =$ ....

    A) 5   B) 6   C) 7   D) 0

15 The rational number $\frac{X-7}{X-9} = 0$, then $X =$ ....

    A) 5   B) 6   C) 7   D) 9

16 The rational number $\frac{X+6}{X+9} = 0$, when $X =$ ....

    A) – 5   B) – 6   C) – 7   D) – 8

Quiz C	Date :	....	الاسـم
Mark	....	16	....	توقيع ولى الأمر

1 If $\frac{X-2}{X-1}$ is a rational number , then $X \neq$ ....
A) 1   B) 2   C) 3   D) 4

2 If $\frac{7}{3-X} \in \mathbb{Q}$, then $X \neq$ ....
A) 3   B) 4   C) 5   D) 7

3 The necessary condition to make $\frac{7}{X-5}$ a rational number is $X \neq$ ....
A) – 3   B) – 5   C) 3   D) 5

4 If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then $X =$ ....
A) 2   B) 3   C) 4   D) 5

5 The number 0.3 = ... (in the rational form)
A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

6 $0.\dot{2}\dot{7} =$ ....
A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

7 If : $\frac{X}{36} = \frac{5}{12}$ then $X =$ ....
A) 25   B) 4   C) 15   D) 45

8 If $\frac{X}{Y} = 1$, then $8X - 8Y =$ ....
A) 0   B) 6   C) 7   D) 9

9 If $\frac{X-7}{5} = 0$, then the value of X is ....
A) 5   B) 6   C) 7   D) 9

10 The rational number $\frac{X+7}{X+9} = 0$, when $X =$ ....
A) – 5   B) – 6   C) – 7   D) – 8

11 If $\frac{X-3}{X-2}$ is a rational number , then $X \neq$ ....
A) 1   B) 2   C) 3   D) 4

12 If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$ ....
A) 3   B) 4   C) 5   D) 7

13 The necessary condition to make $\frac{7}{X+3}$ a rational number is $X \neq$ ....
A) – 3   B) – 5   C) 3   D) 5

14 The number 0.5 = ... (in the rational form)
A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

15 $0.\dot{5}\dot{1} =$ ....
A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

16 If : $\frac{X}{72} = \frac{5}{8}$ then $X =$ ....
A) 25   B) 4   C) 15   D) 45

Quiz D	Date :	....	الاسـم
Mark	....	**16**	.... توقيع ولى الأمر

1 If : $\dfrac{15}{X} = \dfrac{-3}{4}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

2 If $\dfrac{X}{Y} = 1$, then 2 X – 2 Y = ...

    A) 1   B) 2   C) 0   D) 4

3 The rational number $\dfrac{X-2}{X-9} = 0$, then X = ...

    A) 1   B) 2   C) 3   D) 4

4 If $\dfrac{X+1}{X+9} = 0$, then the value of X is ....

    A) – 1   B) – 2   C) – 3   D) – 4

5 The number $\dfrac{1}{X}$ is a rational, then X ≠ ....

    A) 1   B) 2   C) 3   D) zero

6 If $\dfrac{X-2}{X-5}$ is a rational number , then X ≠ ....

    A) 5   B) 6   C) 7   D) 8

7 If $\dfrac{X-1}{X-5} \in \mathbb{Q}$, then X ≠ ....

    A) 3   B) 4   C) 5   D) 7

8 The necessary condition to make $\dfrac{X-2}{X+2}$ a rational number is X ≠ ....

    A) – 1   B) – 2   C) 3   D) 4

9 $0.\dot{3} = $ ....

    A) $\dfrac{1}{3}$ B) $\dfrac{2}{3}$ C) $\dfrac{5}{33}$ D) $\dfrac{2}{11}$

10 If : $\dfrac{2}{5} = \dfrac{X}{10}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

11 If $\dfrac{X}{Y} = 1$, then 3 X – 3 Y = ...

    A) 1   B) 2   C) 3   D) 0

12 The rational number $\dfrac{X-3}{X-9} = 0$, then X = ...

    A) 1   B) 2   C) 3   D) 4

13 If $\dfrac{X+2}{X+9} = 0$, then the value of X is ....

    A) – 1   B) – 2   C) – 3   D) – 4

14 The number $\dfrac{2}{X}$ is a rational, then X ≠ ....

    A) 1   B) 2   C) 3   D) zero

15 If $\dfrac{X-2}{X-6}$ is a rational number , then X ≠ ....

    A) 5   B) 6   C) 7   D) 8

16 The number 0.9 = ... (in the rational form)

    A) $\dfrac{3}{10}$ B) $\dfrac{5}{10}$ C) $\dfrac{7}{10}$ D) $\dfrac{9}{10}$

Exercises

Quiz A	Date :	.... الاسـم
Mark	 15	.... توقيع ولى الأمر

1 The number $0.3 =$ .... (in the rational form)

    A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

2 $0.2\dot{7} =$ ....

    A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

3 If : $\frac{X}{72} = \frac{5}{8}$ then X = ...

    A) 25   B) 4   C) 15   D) 45

4 The rational number $\frac{X-1}{X-9} = 0$, then X = ...

    A) 1   B) 2   C) 3   D) 4

5 If $\frac{X+1}{X+9} = 0$, then the value of X is ....

    A) – 1   B) – 2   C) – 3   D) – 4

6 The number $\frac{2}{X}$ is a rational, then X ≠ ....

    A) 1   B) 2   C) 3   D) zero

7 If $\frac{X-2}{X-7}$ is a rational number , then X ≠ ....

    A) 5   B) 6   C) 7   D) 8

8 The number $\frac{X+7}{X-5} \in \mathbb{Q}$, if X ≠ ....

    A) 3   B) 4   C) 5   D) 7

9 If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then X = ...

    A) 2   B) 3   C) 7   D) 5

10 Which of the following is lies between : $\frac{7}{11}$, $\frac{7}{20}$? ....

    A) $\frac{7}{10}$ B) $\left|-\frac{7}{11}\right|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$

11 If $\triangle + \square = 20$, $\triangle + \triangle + \square = 35$, then $\triangle =$ ....

    A) 5   B) 10   C) 15   D) 20

12 $0.2\dot{1} =$ ....

    A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

13 If : $\frac{X}{36} = \frac{5}{12}$ then X = ...

    A) 25   B) 4   C) 15   D) 45

14 If $\frac{X}{Y} = 1$, then $9X - 9Y =$ ....

    A) 5   B) 6   C) 0   D) 9

15 If $\frac{X-8}{X-9} = 0$, then the value of X is ....

    A) 5   B) 6   C) 7   D) 8

Quiz B	Date :	....	الاسـم
Mark	....	16	....	توقيع ولى الأمر

1 If $\frac{3}{X-5} \in \mathbb{Q}$, then X ≠ ....

    A) 3   B) 4   C) 5   D) 7

2 The necessary condition to make $\frac{X-2}{X+2}$ a rational number is X ≠ ....

    A) – 1   B) – 2   C) 3   D) 4

3 $|\frac{-2}{3}|$ .... zero

    A) >   B) <   C) =   D) ≤

4 Which of the following is the value of X which : $X < 1 < \frac{1}{X}$

    A) 1   B) –1   C) 1/4   D) – 1/3

5 $0.\dot{3} =$ ....

    A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

6 If : $\frac{X}{24} = \frac{5}{12}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

7 If $\frac{X}{Y} = 1$, then 5 X – 5 Y = ...

    A) 5   B) 0   C) 7   D) 9

8 The rational number $\frac{X-6}{X-9} = 0$, then X = ...

    A) 5   B) 6   C) 7   D) 9

9 The rational number $\frac{X+6}{X+9} = 0$, when X = ...

    A) – 5   B) – 6   C) – 7   D) – 8

10 If $\frac{X-3}{X-2}$ is a rational number , then X ≠ ....

    A) 1   B) 2   C) 3   D) 4

11 If $\frac{5}{X-4} \in \mathbb{Q}$, then X ≠ ....

    A) 3   B) 4   C) 5   D) 7

12 The necessary condition to make $\frac{X-1}{X+1}$ a rational number is X ≠ ....

    A) – 1   B) – 2   C) 3   D) 4

13 The smallest fraction of the following is ....

    A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{8}$ D) $\frac{7}{16}$

14 Which of the following is the value of X which : $X < 1 < \frac{1}{X}$

    A) 1   B) –1   C) 1/3   D) – 1/3

15 If $a + \frac{2}{a} = 9\frac{2}{9}$, then a = ...

    A) 3   B) 5   C) 7   D) 9

16 The number 0.9 = ... (in the rational form)

    A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

Quiz C	Date :	....	الاسـم
Mark	....	16	....	توقيع ولى الأمر

1 $0.1\overset{..}{5} = $ ....

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

2 If : $\frac{20}{X} = \frac{4}{5}$ then X = ...

A) 25   B) 4   C) 15   D) 45

3 If $\frac{X}{Y} = 1$, then $7X - 7Y = $ ....

A) 5   B) 6   C) 7   D) 0

4 If $\frac{X-7}{5} = 0$, then the value of X is ....

A) 5   B) 6   C) 7   D) 9

5 The rational number $\frac{X+8}{X+9} = 0$, when X = ...

A) -5 B) -6 C) -7 D) -8

6 If $\frac{X-2}{X-4}$ is a rational number , then X $\neq$ ....

A) 1   B) 2   C) 3   D) 4

7 If $\frac{X-1}{X-5} \in \mathbb{Q}$, then X $\neq$ ....

A) 3   B) 4   C) 5   D) 7

8 The necessary condition to make $\frac{X+3}{X-3}$ a rational number is X $\neq$ ....

A) -1 B) -2 C) 3   D) 4

9 $\left|\frac{-3}{5}\right|$ .... zero

A) >   B) <   C) =   D) $\leq$

10 Which of the following is the value of X which : $X < 1 < \frac{1}{X}$

A) 1   B) -1 C) 1/5   D) $-1/3$

11 $0.\overset{.}{6} = $ ....

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

12 If : $\frac{X}{24} = \frac{5}{8}$ then X = ...

A) -20 B) 4   C) 10   D) 15

13 If $\frac{X}{Y} = 1$, then $6X - 6Y = $ ....

A) 5   B) 6   C) 0   D) 9

14 The rational number $\frac{X-7}{X-9} = 0$, then X = ...

A) 5   B) 6   C) 7   D) 9

15 The rational number $\frac{X+7}{X+9} = 0$, when X = ...

A) -5 B) -6 C) -7 D) -8

16 If $\frac{X-2}{X-3}$ is a rational number , then X $\neq$ ....

A) 1   B) 2   C) 3   D) 4

الاسـم				
Quiz D	Date :		....	
Mark	....	17	....	توقيع ولى الأمر

1 The number $\frac{1}{X}$ is a rational, then $X \neq$ ....

    A) 1   B) 2   C) 3   D) zero

2 If $\frac{X-2}{X-6}$ is a rational number , then $X \neq$ ....

    A) 5   B) 6   C) 7   D) 8

3 The number $\frac{X+7}{X-7} \in \mathbb{Q}$, if $X \neq$ ....

    A) 3   B) 4   C) 5   D) 7

4 If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then $X =$ ....

    A) 2   B) 3   C) 4   D) 5

5 $|\frac{-2}{7}|$ .... zero

    A) >   B) <   C) =   D) $\leq$

6 If $\triangle + \square = 20$, $\triangle + \triangle + \square = 30$, then $\triangle =$ ....

    A) 5   B) 10   C) 15   D) 20

7 $0.\dot{1}\dot{8} =$ ....

    A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

8 If $\triangle + \square = 25$, $\triangle + \triangle + \square = 45$, then $\triangle =$ ....

    A) 5   B) 10   C) 15   D) 20

9 If : $\frac{2}{5} = \frac{X}{15}$ then $X =$ ....

    A) 25   B) 4   C) 15   D) 45

10 If $\frac{X}{Y} = 1$, then $8X - 8Y =$ ....

    A) 0   B) 6   C) 7   D) 9

11 If $\frac{X-9}{X-3} = 0$, then the value of X is ....

    A) 5   B) 6   C) 7   D) 9

12 The rational number $\frac{X+9}{X+5} = 0$, when $X =$ ....

    A) – 5   B) – 6   C) – 9   D) – 8

13 If $\frac{X-2}{X-5}$ is a rational number , then $X \neq$ ....

    A) 5   B) 6   C) 7   D) 8

14 If $\frac{X+1}{X-5} \in \mathbb{Q}$, then $X \neq$ ....

    A) 3   B) 4   C) 5   D) 7

15 The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$ ....

    A) – 1   B) – 2   C) 3   D) 4

16 $|\frac{-3}{2}|$ .... zero

    A) >   B) <   C) =   D) $\leq$

17 If $\triangle + \square = 20$, $\triangle + \triangle + \square = 25$, then $\triangle =$ ....

    A) 5   B) 10   C) 15   D) 20

Quiz E	Date :	....	الاسـم
Mark	....	**16**	....	توقيع ولى الأمر

1 If : $\frac{2}{5} = \frac{X}{10}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

2 If $\frac{X}{Y} = 1$, then $4X - 4Y =$ ....

    A) 0   B) 2   C) 3   D) 4

3 The rational number $\frac{X-5}{X-9} = 0$, then X = ...

    A) 5   B) 6   C) 7   D) 9

4 The rational number $\frac{X+5}{X+9} = 0$, when X = ...

    A) – 5   B) – 6   C) – 7   D) – 8

5 If $\frac{X-2}{X-1}$ is a rational number , then $X \neq$ ....

    A) 1   B) 2   C) 3   D) 4

6 If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$ ....

    A) 3   B) 4   C) 5   D) 7

7 The necessary condition to make $\frac{7}{X+5}$ a rational number is $X \neq$ ....

    A) – 3   B) – 5   C) 3   D) 5

8 The smallest fraction of the following is ....

    A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{16}$ D) $\frac{7}{16}$

9 Which of the following is the value of X which : $X < 1 < \frac{1}{X}$

    A) 1   B) –1   C) 1/2   D) – 1/3

10 If $a + \frac{2}{a} = 7\frac{2}{7}$, then a = ...

    A) 3   B) 5   C) 7   D) 9

11 The number 0.7 = ... (in the rational form)

    A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

12 If : $\frac{15}{X} = \frac{-3}{4}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

13 If $\frac{X}{Y} = 1$, then $3X - 3Y =$ ....

    A) 1   B) 2   C) 3   D) 0

14 The rational number $\frac{X-4}{X-9} = 0$, then X = ...

    A) 1   B) 2   C) 3   D) 4

15 The rational number $\frac{X+4}{X+9} = 0$, ehen X = ...

    A) – 1   B) – 2   C) – 3   D) – 4

16 The number $\frac{5}{X}$ is a rational, then $X \neq$ ....

    A) 1   B) 2   C) 3   D) zero

Homework

Quiz	A	Date :	....	الاسـم
Mark	....	**15**	....	توقيع ولى الأمر

1 If $\frac{7}{3-X} \in \mathbb{Q}$, then X ≠ ....
   - A) 3
   - B) 4
   - C) 5
   - D) 7

2 The necessary condition to make $\frac{7}{X+3}$ a rational number is X ≠ ....
   - A) – 3
   - B) – 5
   - C) 3
   - D) 5

3 The smallest fraction of the following is ....
   - A) $\frac{1}{2}$
   - B) $\frac{3}{40}$
   - C) $\frac{5}{8}$
   - D) $\frac{7}{16}$

4 Which of the following is lies between : $\frac{7}{10}$, $\frac{7}{14}$?
   - A) $\frac{7}{10}$
   - B) $|-\frac{7}{11}|$
   - C) $\frac{7}{15}$
   - D) $\frac{7}{22}$

5 If $a + \frac{2}{a} = 5\frac{2}{5}$, then a = ...
   - A) 3
   - B) 5
   - C) 7
   - D) 9

6 The number 0.5 = ... (in the rational form)
   - A) $\frac{3}{10}$
   - B) $\frac{5}{10}$
   - C) $\frac{7}{10}$
   - D) $\frac{9}{10}$

7 $0.\overset{..}{5}\overset{.}{7}$ = ...
   - A) $\frac{7}{33}$
   - B) $\frac{3}{11}$
   - C) $\frac{17}{33}$
   - D) $\frac{19}{33}$

8 If $\frac{X}{Y} = 1$, then $2X - 2Y$ = ...
   - A) 1
   - B) 2
   - C) 0
   - D) 4

9 The rational number $\frac{X-3}{X-9} = 0$, then X = ...
   - A) 1
   - B) 2
   - C) 3
   - D) 4

10 If $\frac{X+3}{X+9} = 0$, then the value of X is ....
   - A) – 1
   - B) – 2
   - C) – 3
   - D) – 4

11 The number $\frac{4}{X}$ is a rational, then X ≠ ....
   - A) 1
   - B) 2
   - C) 3
   - D) zero

12 If $\frac{X-2}{X-9}$ is a rational number , then X ≠ ....
   - A) 5
   - B) 6
   - C) 7
   - D) 9

13 The necessary condition to make $\frac{7}{X-5}$ a rational number is X ≠ ....
   - A) – 3
   - B) – 5
   - C) 3
   - D) 5

14 If $\triangle + \square = 20$, $\triangle + \triangle + \square = 25$, then $\triangle$ = ...
   - A) 5
   - B) 10
   - C) 15
   - D) 20

15 The smallest fraction of the following is ....
   - A) $\frac{1}{12}$
   - B) $\frac{3}{4}$
   - C) $\frac{5}{8}$
   - D) $\frac{7}{16}$

الاسـم	....	Date :	Quiz B
توقيع ولى الأمر	....	15	.... Mark

1 Which of the following is lies between : $\frac{7}{9}$, $\frac{7}{11}$? ....

 A) $\frac{7}{10}$ B) $|-\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$

2 If $a + \frac{2}{a} = 3\frac{2}{3}$, then a = ...

 A) 3   B) 5   C) 7   D) 9

3 $0.5\dot{1} = $ ....

 A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

4 If $\frac{X}{Y} = 1$, then X – Y = ...

 A) 1   B) 0   C) 3   D) 4

5 The rational number $\frac{X-2}{X-9} = 0$, then X = ...

 A) 1   B) 2   C) 3   D) 4

6 If $\frac{X+2}{X+9} = 0$, then the value of X is ....

 A) – 1   B) – 2   C) – 3   D) – 4

7 The number $\frac{3}{X}$ is a rational, then X ≠ ....

 A) 1   B) 2   C) 3   D) zero

8 If $\frac{X-2}{X-8}$ is a rational number , then X ≠ ....

 A) 5   B) 6   C) 7   D) 8

9 The necessary condition to make $\frac{7}{X-3}$ a rational number is X ≠ ....

 A) – 3   B) – 5   C) 3   D) 5

10 If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then X = ...

 A) 2   B) 3   C) 4   D) 5

11 Which of the following is lies between : $\frac{7}{20}$, $\frac{7}{25}$? ....

 A) $\frac{7}{10}$ B) $|-\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$

12 The number 0.3 = ... (in the rational form)

 A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

13 If $\frac{X+1}{X+9} = 0$, then the value of X is ....

 A) – 1   B) – 2   C) – 3   D) – 4

14 Which of the following is lies between : $\frac{7}{11}$, $\frac{7}{20}$? ....

 A) $\frac{7}{10}$ B) $|-\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$

15 If $\frac{X-8}{X-9} = 0$, then the value of X is ....

 A) 5   B) 6   C) 7   D) 8

الاسـم		....	....	Date :	C	Quiz
توقيع ولى الأمر		....	**16**	....		**Mark**

1 $\left|\frac{-2}{7}\right|$ .... zero

    A) >   B) <   C) =   D) $\leq$

2 If $\frac{X-9}{X-3} = 0$, then the value of X is ....

    A) 5   B) 6   C) 7   D) 9

3 $\left|\frac{-3}{2}\right|$ .... zero

    A) >   B) <   C) =   D) $\leq$

4 If $\frac{X-7}{5} = 0$, then the value of X is ....

    A) 5   B) 6   C) 7   D) 9

5 $\left|\frac{-3}{5}\right|$ .... zero

    A) >   B) <   C) =   D) $\leq$

6 The rational number $\frac{X-7}{X-9} = 0$, then X = ...

    A) 5   B) 6   C) 7   D) 9

7 $\left|\frac{-2}{3}\right|$ .... zero

    A) >   B) <   C) =   D) $\leq$

8 The rational number $\frac{X-6}{X-9} = 0$, then X = ...

    A) 5   B) 6   C) 7   D) 9

9 The smallest fraction of the following is ....

    A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{8}$ D) $\frac{7}{16}$

10 If $\frac{X}{Y} = 1$, then $4X - 4Y = $ ....

    A) 0   B) 2   C) 3   D) 4

11 The necessary condition to make $\frac{7}{X+5}$ a rational number is X $\neq$ ....

    A) – 3   B) – 5   C) 3   D) 5

12 If : $\frac{15}{X} = \frac{-3}{4}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

13 If $\frac{7}{3-X} \in \mathbb{Q}$, then X $\neq$ ....

    A) 3   B) 4   C) 5   D) 7

14 The number 0.5 = ... (in the rational form)

    A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

15 The number $\frac{4}{X}$ is a rational, then X $\neq$ ....

    A) 1   B) 2   C) 3   D) zero

16 If $a + \frac{2}{a} = 3\frac{2}{3}$, then a = ...

    A) 3   B) 5   C) 7   D) 9

Quiz D	Date :	....	الاسـم
Mark	....	17	....	توقيع ولى الأمر

1 The number $\frac{3}{X}$ is a rational, then $X \neq$ ....

A) 1   B) 2   C) 3   D) zero

2 If $\triangle + \square = 25$, $\triangle + \triangle + \square = 45$, then $\triangle =$ ....

A) 5   B) 10   C) 15   D) 20

3 The rational number $\frac{X-1}{X-9} = 0$, then $X =$ ....

A) 1   B) 2   C) 3   D) 4

4 If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then $X =$ ....

A) 2   B) 3   C) 7   D) 5

5 If $\frac{X}{Y} = 1$, then $9X - 9Y =$ ....

A) 5   B) 6   C) 0   D) 9

6 If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then $X =$ ....

A) 2   B) 3   C) 4   D) 5

7 If $\frac{X}{Y} = 1$, then $8X - 8Y =$ ....

A) 0   B) 6   C) 7   D) 9

8 The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$ ....

A) – 1   B) – 2   C) 3   D) 4

9 If $\frac{X}{Y} = 1$, then $7X - 7Y =$ ....

A) 5   B) 6   C) 7   D) 0

10 The necessary condition to make $\frac{X+3}{X-3}$ a rational number is $X \neq$ ....

A) – 1   B) – 2   C) 3   D) 4

11 If $\frac{X}{Y} = 1$, then $6X - 6Y =$ ....

A) 5   B) 6   C) 0   D) 9

12 The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq$ ....

A) – 1   B) – 2   C) 3   D) 4

13 If $\frac{X}{Y} = 1$, then $5X - 5Y =$ ....

A) 5   B) 0   C) 7   D) 9

14 The necessary condition to make $\frac{X-1}{X+1}$ a rational number is $X \neq$ ....

A) – 1   B) – 2   C) 3   D) 4

15 If : $\frac{2}{5} = \frac{X}{10}$ then $X =$ ....

A) – 20   B) 4   C) 10   D) 15

16 If $\triangle + \square = 20$, $\triangle + \triangle + \square = 30$, then $\triangle =$ ....

A) 5   B) 10   C) 15   D) 20

17 If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$ ....

A) 3   B) 4   C) 5   D) 7

Quiz	E	Date :	....	الاسـم
Mark		 9	....	توقيع ولى الأمر

1 The number 0.7 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

2 The number $\frac{5}{X}$ is a rational, then X $\neq$ ....

A) 1 B) 2 C) 3 D) zero

3 If a + $\frac{2}{a}$ = $5\frac{2}{5}$, then a = ...

A) 3 B) 5 C) 7 D) 9

4 If $\frac{X+3}{X+9}$ = 0 , then the value of X is ....

A) – 1 B) – 2 C) – 3 D) – 4

5 Which of the following is lies between : $\frac{7}{9}$, $\frac{7}{11}$? ....

A) $\frac{7}{10}$ B) $|-\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$

6 If $\frac{X+2}{X+9}$ = 0 , then the value of X is ....

A) – 1 B) – 2 C) – 3 D) – 4

7 Which of the following is lies between : $\frac{7}{20}$, $\frac{7}{25}$? ....

A) $\frac{7}{10}$ B) $|-\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$

8 If : $\frac{X}{72}$ = $\frac{5}{8}$ then X = ...

A) 25 B) 4 C) 15 D) 45

9 The number $\frac{X+7}{X-5}$ $\in \mathbb{Q}$, if X $\neq$ ....

A) 3 B) 4 C) 5 D) 7

[C] : Essay Problems : -

1 Arrange in an descending order : $-\frac{1}{10}$, $\frac{4}{15}$, -2 , $-\frac{3}{5}$,

2018 Exam (10) Question (3) (b)

2 Find three rational numbers lying between : $\frac{1}{4}$ and $\frac{1}{5}$

2018 Exam (10) Question (4) (a)

3 Find three rational numbers that are lying between : $\frac{1}{5}$ and $\frac{1}{3}$

2018 Exam (15) Question (3) (b)

4 Find two rational numbers between : $\frac{2}{3}$ and $\frac{3}{7}$

2018 Exam (1) Question (4) (b)

5 Find three rational numbers lying between : $\frac{1}{3}$ and $\frac{3}{4}$ such that one of them is an integer

2018 Exam (13) Question (3) (b)

Exercises

Quiz	A	Date :	....	الاسـم
Mark	....	15	....	توقيع ولى الأمر

1 The remainder of $\frac{3}{4}$ from $\frac{21}{28}$ is ....
   A) 2   B) 0   C) 1   D) – 1

2 $\frac{1}{2} + \frac{1}{3} =$ ....
   A) $\frac{5}{6}$ B) $\frac{1}{15}$ C) $\frac{5}{4}$ D) $\frac{-2}{21}$

3 $\frac{-3}{5} + \frac{2}{3} =$ ....
   A) $\frac{5}{6}$ B) $\frac{1}{15}$ C) $\frac{5}{4}$ D) $\frac{-2}{21}$

4 $\frac{1}{2} + \frac{3}{4} =$ ....
   A) $\frac{5}{6}$ B) $\frac{1}{15}$ C) $\frac{5}{4}$ D) $\frac{-2}{21}$

5 $\frac{-2}{3} + \frac{4}{7} =$ ....
   A) $\frac{5}{6}$ B) $\frac{1}{15}$ C) $\frac{5}{4}$ D) $\frac{-2}{21}$

6 $0.18 - 3\% =$ ....
   A) 0.15   B) – 0.12   C) – 0.15   D) 0.12

7 $0.18 - 30\% =$ ....
   A) 0.15   B) – 0.12   C) – 0.15   D) 0.12

8 $0.15 - 3\% =$ ....
   A) 0.15   B) – 0.12   C) – 0.15   D) 0.12

9 $0.15 - 30\% =$ ....
   A) 0.15   B) – 0.12   C) – 0.15   D) 0.12

10 $\frac{3X}{7} - \frac{X}{7} =$ ....
   A) 2/7   B) 2X/7   C) 3X/7   D) 4X/7

11 $\frac{4X}{7} - \frac{X}{7} =$ ....
   A) 3/7   B) 2X/7   C) 3X/7   D) 4X/7

12 $\frac{5X}{7} - \frac{X}{7} =$ ....
   A) 24/7   B) 2X/7   C) 3X/7   D) 4X/7

13 $\frac{6X}{7} - \frac{X}{7} =$ ....
   A) 5/7   B) 5X/7   C) 3X/7   D) 4X/7

14 $- |-7/2|$ .... The additive of 7/2
   A) <   B) >   C) =

15 $|-7/2|$ .... The additive of 7/2
   A) <   B) >   C) =

Quiz B	Date :	....	الاسـم
Mark	....	17	....	توقيع ولى الأمر

1 The additive inverse of : $\frac{9}{25} \times (-5)^2$ is ....

    A) – 7   B) 7   C) – 9   D) 9

2 The additive inverse of : $\frac{-9}{25} \times (-5)^2$ is ....

    A) – 7   B) 7   C) – 9   D) 9

3 The additive inverse of : $\frac{-9}{-7}$ is ....

    A) – 9/7   B) 9/7   C) –7/9   D) 7/9

4 The additive inverse of : $\frac{-7}{-9}$ is ....

    A) – 9/7   B) 9/7   C) –7/9   D) 7/9

5 The value of $|\,1\,| + |-6\,| = $ ....

    A) 5   B) 6   C) 7   D) 8

6 The value of $|\,1\,| + |-7\,| = $ ....

    A) 5   B) 6   C) 7   D) 8

7 The value of $|-8\,| - |-6\,| = $ ....

    A) 2   B) 3   C) 4   D) 5

8 The value of $|-8\,| - |-5\,| = $ ....

    A) 2   B) 3   C) 4   D) 5

9 The value of $|-8\,| - |-4\,| = $ ....

    A) 2   B) 3   C) 4   D) 5

10 The value of $|-8\,| - |-3\,| = $ ....

    A) 2   B) 3   C) 4   D) 5

11 The value of $|-9\,| - |-4\,| = $ ....

    A) 5   B) 6   C) 7   D) 8

12 The value of $|-9\,| - |-3\,| = $ ....

    A) 5   B) 6   C) 7   D) 8

13 The value of $|-9\,| - |-2\,| = $ ....

    A) 5   B) 6   C) 7   D) 8

14 The value of $|-9\,| - |-1\,| = $ ....

    A) 5   B) 6   C) 7   D) 8

15 The remainder of $\frac{1}{3}$ from $\frac{3}{9}$ is ....

    A) 2   B) 0   C) 1   D) – 1

16 The remainder of $\frac{2}{3}$ from $\frac{6}{9}$ is ....

    A) 2   B) 0   C) 1   D) – 1

17 The remainder of $\frac{1}{2}$ from $\frac{7}{14}$ is ....

    A) 2   B) 0   C) 1   D) – 1

Quiz C	Date :	....	الاســم
Mark	....	13	....	توقيع ولى الأمر

1. The additive inverse of : $(\frac{4}{9})^{zero}$ is ....

    A) 0   B) 1   C) – 1   D) 2

2. The additive inverse of : $(\frac{7}{5})^{zero}$ is ....

    A) 0   B) 1   C) – 1   D) 2

3. The additive inverse of : $(\frac{1}{2})^2$ is ....

    A) 0   B) 1   C) – 1   D) 2

4. The additive inverse of : $(\frac{1}{3})^2$ is ....

    A) $\frac{-1}{4}$ B) $\frac{-1}{9}$ C) $\frac{-4}{9}$ D) $\frac{-4}{25}$

5. The additive inverse of : $(-\frac{2}{3})^2$ is ....

    A) $\frac{-1}{4}$ B) $\frac{-1}{9}$ C) $\frac{-4}{9}$ D) $\frac{-4}{25}$

6. The additive inverse of : $(\frac{-2}{5})^2$ is ....

    A) $\frac{-1}{4}$ B) $\frac{-1}{9}$ C) $\frac{-4}{9}$ D) $\frac{-4}{25}$

7. The additive inverse of the number .... is itself

    A) 0   B) 1   C) – 1   D) 2

8. The additive inverse of : $\frac{1}{|-5|}$ is ....

    A) $\frac{-1}{5}$ B) $\frac{-1}{2}$ C) $\frac{1}{5}$ D) $\frac{1}{2}$

9. The additive inverse of : $\left|-\frac{1}{2}\right|$ is ....

    A) $\frac{-1}{5}$ B) $\frac{-1}{2}$ C) $\frac{1}{5}$ D) $\frac{1}{2}$

10. The additive inverse of : $\frac{-1}{|-5|}$ is ....

    A) $\frac{-1}{5}$ B) $\frac{-1}{2}$ C) $\frac{1}{5}$ D) $\frac{1}{2}$

11. The additive inverse of : $\frac{-1}{|-2|}$ is ....

    A) $\frac{-1}{5}$ B) $\frac{-1}{2}$ C) $\frac{1}{5}$ D) $\frac{1}{2}$

12. The additive inverse of : $\frac{7}{25} \times (-5)^2$ is ....

    A) – 7   B) 7   C) – 9   D) 9

13. The additive inverse of : $\frac{-7}{25} \times (-5)^2$ is ....

    A) – 7   B) 7   C) – 9   D) 9

Quiz D	Date :	....	الاســـم
Mark	....	15	....	توقيع ولى الأمر

1 The additive identity element in $\mathbb{Q}$ is ....
   A) 0   B) 1   C) – 1   D) 2

2 The additive neutral element in $\mathbb{Q}$ is ....
   A) 0   B) 1   C) – 1   D) 2

3 The additive inverse of zero is ....
   A) 0   B) – 5   C) 2   D) 5

4 The additive inverse of : | – 2 |is ....
   A) – 2   B) – 5   C) 2   D) 5

5 The additive inverse of : | – 5 |is ....
   A) – 2   B) – 5   C) 2   D) 5

6 The additive inverse of : – | – 2 |is ....
   A) – 2   B) – 5   C) 2   D) 5

7 The additive inverse of : – | – 5 |is ....
   A) – 2   B) – 5   C) 2   D) 5

8 The additive inverse of : $(\frac{-3}{4})$ is ....
   A) $\frac{3}{4}$ B) $\frac{-3}{4}$ C) $\frac{4}{5}$ D) $\frac{-4}{5}$

9 The additive inverse of : $(\frac{3}{4})$ is ....
   A) $\frac{3}{4}$ B) $\frac{-3}{4}$ C) $\frac{4}{5}$ D) $\frac{-4}{5}$

10 The additive inverse of : $(\frac{-4}{5})$ is ....
   A) $\frac{3}{4}$ B) $\frac{-3}{4}$ C) $\frac{4}{5}$ D) $\frac{-4}{5}$

11 The additive inverse of : $(\frac{4}{5})$ is ....
   A) $\frac{3}{4}$ B) $\frac{-3}{4}$ C) $\frac{4}{5}$ D) $\frac{-4}{5}$

12 The additive inverse of : $(\frac{4}{5})^{zero}$ is ....
   A) 0   B) 1   C) – 1   D) 2

13 The additive inverse of : $(\frac{-2}{7})^{zero}$ is ....
   A) 0   B) 1   C) – 1   D) 2

14 The additive inverse of : $(\frac{-4}{5})^{zero}$ is ....
   A) 0   B) 1   C) – 1   D) 2

15 The additive inverse of : $(\frac{-4}{11})^{zero}$ is ....
   A) 0   B) 1   C) – 1   D) 2

Quiz E	Date :	....	الاسم
Mark	....	16	....	توقيع ولى الأمر

1   – | 7/2 | .... The additive of 7/2

A) <   B) >   C) =

2   If A + $\frac{3}{5}$ = 0 , then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

3   If A – $\frac{3}{5}$ = 0 , then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

4   If A + $\frac{5}{3}$ = 0 , then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

5   If A – $\frac{5}{3}$ = 0 , then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

6   The number 0.3 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

7   The number 0.5 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

8   The number 0.7 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

9   The number 0.9 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

10 $0.\dot{3}$ = ...

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

11 $0.\dot{1}\dot{5}$ = ...

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

12 $0.\dot{1}\dot{8}$ = ...

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

13 $0.\dot{5}\dot{7}$ = ...

A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

14   If : $\frac{15}{X}$ = $\frac{-3}{4}$ then X = ...

A) – 20   B) 4   C) 10   D) 15

15   If : $\frac{2}{5}$ = $\frac{X}{10}$ then X = ...

A) – 20   B) 4   C) 10   D) 15

16   If : $\frac{X}{24}$ = $\frac{5}{12}$ then X = ...

A) – 20   B) 4   C) 10   D) 15

Homework

Quiz	A	Date :	....	الاسـم
Mark	....	**15**	....	توقيع ولى الأمر

1 If : $\dfrac{X}{24} = \dfrac{5}{8}$ then X = ...

A) – 20   B) 4   C) 10   D) 15

2 If $\dfrac{X}{Y} = 1$, then 2 X – 2 Y = ...

A) 1   B) 2   C) 0   D) 4

3 If $\dfrac{X}{Y} = 1$, then 3 X – 3 Y = ...

A) 1   B) 2   C) 3   D) 0

4 If $\dfrac{X}{Y} = 1$, then 4 X – 4 Y = ...

A) 0   B) 2   C) 3   D) 4

5 The rational number $\dfrac{X-1}{X-9} = 0$, then X = ...

A) 1   B) 2   C) 3   D) 4

6 The rational number $\dfrac{X-2}{X-9} = 0$, then X = ...

A) 1   B) 2   C) 3   D) 4

7 The rational number $\dfrac{X-3}{X-9} = 0$, then X = ...

A) 1   B) 2   C) 3   D) 4

8 The rational number $\dfrac{X-4}{X-9} = 0$, then X = ...

A) 1   B) 2   C) 3   D) 4

9 The number $\dfrac{2}{X}$ is a rational, then X $\neq$ ....

A) 1   B) 2   C) 3   D) zero

10 The number $\dfrac{3}{X}$ is a rational, then X $\neq$ ....

A) 1   B) 2   C) 3   D) zero

11 The number $\dfrac{4}{X}$ is a rational, then X $\neq$ ....

A) 1   B) 2   C) 3   D) zero

12 If $\dfrac{X-2}{X-7}$ is a rational number , then X $\neq$ ....

A) 5   B) 6   C) 7   D) 8

13 If $\dfrac{X-2}{X-8}$ is a rational number , then X $\neq$ ....

A) 5   B) 6   C) 7   D) 8

14 If $\dfrac{X-2}{X-9}$ is a rational number , then X $\neq$ ....

A) 5   B) 6   C) 7   D) 9

15 If $\dfrac{7}{3-X} \in \mathbb{Q}$, then X $\neq$ ....

A) 3   B) 4   C) 5   D) 7

Quiz B	Date :	....	الاسـم
Mark	....	16	.... توقيع ولى الأمر

1 If $\frac{X+4}{X-3} \in \mathbb{Q}$, then X $\neq$ ....

    A) 3   B) 4   C) 5   D) 7

2 The necessary condition to make $\frac{X-2}{X+2}$ a rational number is X $\neq$ ....

    A) – 1   B) – 2   C) 3   D) 4

3 The necessary condition to make $\frac{X+3}{X-3}$ a rational number is X $\neq$ ....

    A) – 1   B) – 2   C) 3   D) 4

4 The necessary condition to make $\frac{X+4}{X-4}$ a rational number is X $\neq$ ....

    A) – 1   B) – 2   C) 3   D) 4

5 If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then X = ...

    A) 2   B) 3   C) 4   D) 5

6 The additive identity element in $\mathbb{Q}$ is ....

    A) 0   B) 1   C) – 1   D) 2

7 The value of $| – 8 | – | – 4 | =$ ....

    A) 2   B) 3   C) 4   D) 5

8 $0.5\overset{..}{7} =$ ....

    A) $\frac{7}{33}$ B) $\frac{3}{11}$ C) $\frac{17}{33}$ D) $\frac{19}{33}$

9 The additive inverse of : $(\frac{-4}{5})^{zero}$ is ....

    A) 0   B) 1   C) – 1   D) 2

10 $\frac{-2}{3} + \frac{4}{7} =$ ....

    A) $\frac{5}{6}$ B) $\frac{1}{15}$ C) $\frac{5}{4}$ D) $\frac{-2}{21}$

11 The number $\frac{3}{X}$ is a rational, then X $\neq$ ....

    A) 1   B) 2   C) 3   D) zero

12 The additive inverse of : $\frac{7}{25} \times (-5)^2$ is ....

    A) – 7   B) 7   C) – 9   D) 9

13 If A – $\frac{3}{5}$ = 0 , then A = ...

    A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

14 The additive inverse of : $| – 2 |$ is ....

    A) – 2   B) – 5   C) 2   D) 5

15 The value of $| – 9 | – | – 3 | =$ ....

    A) 5   B) 6   C) 7   D) 8

16 If : $\frac{X}{24} = \frac{5}{12}$ then X = ...

    A) – 20   B) 4   C) 10   D) 15

الاسـم			
Quiz C	Date :		
Mark		16	توقيع ولى الأمر

1 The additive inverse of : $(\frac{7}{5})^{zero}$ is ....

A) 0   B) 1   C) – 1   D) 2

2 0.15 – 3 % = ...

A) 0.15   B) – 0.12   C) – 0.15   D) 0.12

3 If $\frac{X-2}{X-8}$ is a rational number , then $X \neq$ ....

A) 5   B) 6   C) 7   D) 8

4 The additive inverse of : $\frac{-9}{25} \times (-5)^2$ is ....

A) – 7   B) 7   C) – 9   D) 9

5 The number 0.3 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

6 The additive inverse of : $-|-5|$ is ....

A) – 2   B) – 5   C) 2   D) 5

7 The remainder of $\frac{1}{3}$ from $\frac{3}{9}$ is ....

A) 2   B) 0   C) 1   D) – 1

8 If $\frac{X}{Y} = 1$, then $3X - 3Y =$ ....

A) 1   B) 2   C) 3   D) 0

9 The additive inverse of : $(-\frac{2}{3})^2$ is ....

A) $\frac{-1}{4}$ B) $\frac{-1}{9}$ C) $\frac{-4}{9}$ D) $\frac{-4}{25}$

10 $\frac{4X}{7} - \frac{X}{7} =$ ....

A) 3/7   B) 2X/7   C) 3X/7   D) 4X/7

11 If $\frac{X+4}{X-3} \in \mathbb{Q}$, then $X \neq$ ....

A) 3   B) 4   C) 5   D) 7

12 The value of $|1| + |-6| =$ ....

A) 5   B) 6   C) 7   D) 8

13 The number 0.9 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

14 The additive inverse of : $(\frac{-4}{5})$ is ....

A) $\frac{3}{4}$ B) $\frac{-3}{4}$ C) $\frac{4}{5}$ D) $\frac{-4}{5}$

15 The remainder of $\frac{3}{4}$ from $\frac{21}{28}$ is ....

A) 2   B) 0   C) 1   D) – 1

16 The rational number $\frac{X-2}{X-9} = 0$, then $X =$ ....

A) 1   B) 2   C) 3   D) 4

Quiz D	Date :	....	الاســم
Mark	.... **25**	....	توقيع ولى الأمر

1 $-\left| -7/2 \right|$ .... The additive of 7/2
   A) <   B) >   C) =

2 The necessary condition to make $\frac{X+4}{X-4}$ a rational number is X $\neq$ ....
   A) – 1   B) – 2   C) 3   D) 4

3 The value of $\left| -8 \right| - \left| -5 \right| =$ ....
   A) 2   B) 3   C) 4   D) 5

4 $0.\overset{\cdot\cdot}{18} =$ ....
   A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

5 The additive inverse of : $\left(\frac{-2}{7}\right)^{zero}$ is ....
   A) 0   B) 1   C) – 1   D) 2

6 $\frac{1}{2} + \frac{3}{4} =$ ....
   A) $\frac{5}{6}$ B) $\frac{1}{15}$ C) $\frac{5}{4}$ D) $\frac{-2}{21}$

7 The number $\frac{2}{X}$ is a rational, then X $\neq$ ....
   A) 1   B) 2   C) 3   D) zero

8 The additive inverse of : $\frac{-1}{\left| -2 \right|}$ is ....
   A) $\frac{-1}{5}$ B) $\frac{-1}{2}$ C) $\frac{1}{5}$ D) $\frac{1}{2}$

9 If A + $\frac{3}{5}$ = 0 , then A = ...
   A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

10 The additive inverse of zero is ....
   A) 0   B) – 5   C) 2   D) 5

11 The value of $\left| -9 \right| - \left| -4 \right| =$ ....
   A) 5   B) 6   C) 7   D) 8

12 If : $\frac{2}{5} = \frac{X}{10}$ then X = ...
   A) – 20   B) 4   C) 10   D) 15

13 The additive inverse of : $\left(\frac{4}{9}\right)^{zero}$ is ....
   A) 0   B) 1   C) – 1   D) 2

14 $0.18 - 30 \% =$ ....
   A) 0.15   B) – 0.12   C) – 0.15   D) 0.12

15 If $\frac{X-2}{X-7}$ is a rational number , then X $\neq$ ....
   A) 5   B) 6   C) 7   D) 8

16 The additive inverse of : $\frac{9}{25} \times (-5)^2$ is ....
   A) – 7   B) 7   C) – 9   D) 9

17	If A $- \frac{5}{3}$ = 0 , then A = ...
	A) 3/5 B) $-$ 3/5 C) $-$ 5/3 D) 5/3
18	The additive inverse of : $-$ | $-$ 2 |is ....
	A) $-$ 2 B) $-$ 5 C) 2 D) 5
19	The value of | $-$ 9 | $-$ | $-$ 1 | = ...
	A) 5 B) 6 C) 7 D) 8
20	If $\frac{X}{Y}$ = 1 , then 2 X $-$ 2 Y = ...
	A) 1 B) 2 C) 0 D) 4
21	The additive inverse of : $(\frac{1}{3})^2$ is ....
	A) $\frac{-1}{4}$ B) $\frac{-1}{9}$ C) $\frac{-4}{9}$ D) $\frac{-4}{25}$
22	$\frac{3X}{7} - \frac{X}{7}$ = ...
	A) 2/7 B) 2X/7 C) 3X/7 D) 4X/7
23	If $\frac{7}{3-X} \in \mathbb{Q}$, then X $\neq$ ....
	A) 3 B) 4 C) 5 D) 7
24	The additive inverse of : $\frac{-7}{-9}$ is ....
	A) $-$ 9/7 B) 9/7 C) $-$7/9 D) 7/9
25	The number 0.7 = ... (in the rational form)
	A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

[C] : Essay Problems : -

1	If the two rational numbers $\frac{3X}{4}$ and $\frac{2}{3}$ are equal , find the value of X :
	2016 Exam (3) Question (4) (a)
2	Find in the simplest form the value of each of the following :
	1) $15\frac{1}{4} + 12\frac{1}{2}$ 2) $0.1\dot{8} - 25\%$
	2016 Exam (12) Question (3) (a)
3	Use properties of addition of rational numbers to calculate the value of :
	$\frac{5}{4} - (-\frac{13}{5}) + \frac{15}{4} - \frac{3}{5}$
	2018 Exam (3) Question (3) (a)
4	Find the value of : $-13\frac{7}{8} - (-6\frac{7}{8})$
	2018 Exam (3) Question (4) (a)
5	If a $= \frac{7}{4}$, b $= -\frac{1}{2}$, find the value of the expression : (a $-$ b) + (a + b)
	2018 Exam (6) Question (3) (b)

Exercises

Quiz	A	Date :	....	الاسـم
Mark		....	17	....	توقيع ولى الأمر

1	The quotient of dividing $2.25 \div 1.5 = $ .... A) 1.5 B) 0.15 C) 15 D) 150
2	The quotient of dividing $22.5 \div 1.5 = $ .... A) 1.5 B) 0.15 C) 15 D) 150
3	The quotient of dividing $225 \div 1.5 = $ .... A) 1.5 B) 0.15 C) 15 D) 150
4	The quotient of dividing $0.225 \div 1.5 = $ .... A) 1.5 B) 0.15 C) 15 D) 150
5	Zero $\div$ (15) = ... A) 1.5 B) 0.15 C) 15 D) zero
6	Zero $\div$ (-25) = ... A) 1.5 B) 0.15 C) 15 D) zero
7	Zero $\div$ (-36) = ... A) 1.5 B) 0.15 C) 15 D) zero
8	Zero $\div$ (78) = ... A) 1.5 B) 0.15 C) 15 D) zero
9	$|-5| + 2 \times 3 - |1| = $ .... A) 10 B) 9 C) 8 D) 7
10	$|-5| + 2 \times 3 - |2| = $ .... A) 10 B) 9 C) 8 D) 7
11	$|-5| + 2 \times 3 - |3| = $ .... A) 10 B) 9 C) 8 D) 7
12	$|-5| + 2 \times 3 - |4| = $ .... A) 10 B) 9 C) 8 D) 7
13	1/3 of 27 is .... A) 9 B) 3 C) 8 D) 4
14	1/9 of 27 is .... A) 9 B) 3 C) 8 D) 4
15	1/3 of 24 is .... A) 9 B) 3 C) 8 D) 4
16	1/6 of 24 is .... A) 9 B) 3 C) 8 D) 4
17	The number which has no multiplicative inverse .... A) 0 B) 1 C) -1 D) 2

الاسـم			
Quiz B	**Date :**	....	
Mark	....	**15**	.... توقيع ولى الأمر

1 The rational number which has no multiplicative inverse ....
A) 0　　　　B) 1　　　　C) – 1　　　　D) 2

2 The multiplicative identity element in $\mathbb{Q}$ is ....
A) 0　　　　B) 1　　　　C) – 1　　　　D) 2

3 The multiplicative neutral element in $\mathbb{Q}$ is ....
A) 0　　　　B) 1　　　　C) – 1　　　　D) 2

4 The multiplicative inverse of 1 is ....
A) 0　　　　B) 1　　　　C) – 1　　　　D) 2

5 The multiplicative inverse of – 1 is ....
A) 0　　　　B) 1　　　　C) – 1　　　　D) 2

6 The multiplicative inverse of $(\frac{-2}{3})^2$ is
A) 4/9　　　　B) 9/4　　　　C) – 1　　　　D) 1

7 The multiplicative inverse of $(\frac{1}{2})^0$ is ....
A) 0　　　　B) 1　　　　C) – 1　　　　D) 2

8 The multiplicative inverse of 0.5 is ....
A) 0　　　　B) 1　　　　C) – 1　　　　D) 2

9 The multiplicative inverse of $\frac{3}{2}$ is ....
A) $\frac{2}{3}$　　　　B) $\frac{5}{3}$　　　　C) $\frac{2}{7}$　　　　D) $\frac{7}{2}$

10 The multiplicative inverse of $\frac{3}{5}$ is ....
A) $\frac{2}{3}$　　　　B) $\frac{5}{3}$　　　　C) $\frac{2}{7}$　　　　D) $\frac{7}{2}$

11 The multiplicative inverse of $\frac{7}{2}$ is ....
A) $\frac{2}{3}$　　　　B) $\frac{5}{3}$　　　　C) $\frac{2}{7}$　　　　D) $\frac{7}{2}$

12 The multiplicative inverse of $\frac{2}{7}$ is ....
A) $\frac{2}{3}$　　　　B) $\frac{5}{3}$　　　　C) $\frac{2}{7}$　　　　D) $\frac{7}{2}$

13 The multiplicative inverse of $\frac{-2}{7}$ is ....
A) $\frac{-7}{2}$　　　　B) $\frac{-2}{7}$　　　　C) $\frac{-3}{5}$　　　　D) $\frac{-5}{3}$

14 The quotient of dividing 225 ÷ 1.5 = ...
A) 1.5　　　　B) 0.15　　　　C) 15　　　　D) 150

15 The multiplicative inverse of $\frac{-7}{2}$ is ....
A) $\frac{-7}{2}$　　　　B) $\frac{-2}{7}$　　　　C) $\frac{-3}{5}$　　　　D) $\frac{-5}{3}$

الاسـم		
Quiz C	**Date :**	....
Mark	....	**14**	....	توقيع ولى الأمر

1 The multiplicative inverse of $\dfrac{-5}{3}$ is ....

    A) $\dfrac{-7}{2}$ B) $\dfrac{-2}{7}$ C) $\dfrac{-3}{5}$ D) $\dfrac{-5}{3}$

2 The multiplicative inverse of $\dfrac{-3}{5}$ is ....

    A) $\dfrac{-7}{2}$ B) $\dfrac{-2}{7}$ C) $\dfrac{-3}{5}$ D) $\dfrac{-5}{3}$

3 The multiplicative inverse of $1\dfrac{1}{2}$ is ....

    A) $\dfrac{2}{3}$ B) $\dfrac{4}{5}$ C) $\dfrac{2}{7}$ D) $\dfrac{3}{7}$

4 The multiplicative inverse of $1\dfrac{1}{4}$ is ....

    A) $\dfrac{2}{3}$ B) $\dfrac{4}{5}$ C) $\dfrac{2}{7}$ D) $\dfrac{3}{7}$

5 The multiplicative inverse of $3\dfrac{1}{2}$ is ....

    A) $\dfrac{2}{3}$ B) $\dfrac{4}{5}$ C) $\dfrac{2}{7}$ D) $\dfrac{3}{7}$

6 The multiplicative inverse of $2\dfrac{1}{3}$ is ....

    A) $\dfrac{2}{3}$ B) $\dfrac{4}{5}$ C) $\dfrac{2}{7}$ D) $\dfrac{3}{7}$

7 If : $\dfrac{X}{y} = \dfrac{2}{3}$, then $\dfrac{3X}{2y} = $ ....

    A) 0   B) 1   C) – 1   D) – 2

8 The rational number $\dfrac{a-2}{5}$ has a multiplicative inverse if a $\neq$ ....

    A) 2   B) 1   C) – 1   D) – 2

9 The rational number $\dfrac{a-1}{5}$ has a multiplicative inverse if a $\neq$ ....

    A) 2   B) 1   C) – 1   D) – 2

10 The rational number $\dfrac{a+1}{5}$ has a multiplicative inverse if a $\neq$ ....

    A) 2   B) 1   C) – 1   D) – 2

11 The rational number $\dfrac{a+2}{5}$ has a multiplicative inverse if a $\neq$ ....

    A) 2   B) 1   C) – 1   D) – 2

12 $\dfrac{3}{7} \times$ .... $= \dfrac{3}{7}$

    A) 1   B) 3/7   C) 7/3   D) 0

13 $\dfrac{5}{7} \times$ .... $= \dfrac{3}{7}$

    A) 1   B) 5/7   C) 7/5   D) 0

14 $\dfrac{3}{5} \times$ .... $= \dfrac{3}{7}$

    A) 1   B) 3/5   C) 75/3   D) 0

Quiz D	Date :	....	الاسـم
Mark	....	13	....	توقيع ولى الأمر

1 $\frac{5}{8} \times$ .... $= \frac{3}{7}$

    A) 1   B) 5/8   C) 8/5   D) 0

2 The property used in the operation $\frac{3}{5} \times 1 = \frac{3}{7}$ is

    A) Commutative   B) identity   C) closure   D) associative

3 If : $\frac{3}{4} \times n = 1$, then n = ...

    A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$

4 If : $\frac{3}{5} \times n = 1$, then n = ...

    A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$

5 If : $\frac{7}{2} \times n = 1$, then n = ...

    A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$

6 If : $\frac{2}{7} \times n = 1$, then n = ...

    A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$

7 If : $-\frac{3}{4} \times n = 1$, then n = ...

    A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$

8 If : $-\frac{3}{5} \times n = 1$, then n = ...

    A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$

9 If : $-\frac{7}{2} \times n = 1$, then n = ...

    A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$

10 If : $-\frac{2}{7} \times n = 1$, then n = ...

    A) $-\frac{4}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{7}$ D) $-\frac{7}{2}$

11 $1\frac{1}{2} \times$ .... $= 1$

    A) $\frac{2}{3}$ B) $\frac{2}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$

12 $2\frac{1}{3} \times$ .... $= 1$

    A) $\frac{2}{3}$ B) $\frac{3}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$

13 $|-5| + 2 \times 3 - |2| =$ ....

    A) 10   B) 9   C) 8   D) 7

Homework

Quiz	A	Date :	....	الاسـم
Mark	....	**16**	....	توقيع ولى الأمر

1 If $5a = 35$, $ab = 1$, then $b =$ ....
 A) 1/5   B) 1/7   C) 1/9   D) 1/3

2 If $5a = 49$, $ab = 1$, then $b =$ ....
 A) 1/5   B) 1/7   C) 1/9   D) 1/3

3 If $9a = 27$, $ab = 1$, then $b =$ ....
 A) 1/5   B) 1/7   C) 1/9   D) 1/3

4 If $\frac{5}{7} \times n = \frac{5}{7}$, $-\frac{7}{3} \times m = 0$, then $m + n =$ ....
 A) 0   B) 1   C) 5/7   D) – 7/3

5 If $X = -2\frac{1}{5}$, $y = 5\frac{1}{2}$, then $X \div y =$ ....
 A) – 2/5   B) – 5/2   C) – 11/5   D) 11/2

6 If $X = 4$, $y = 6$ and $Z = 24$, then ....
 A) $Z = X/y$ B) $Z = X - y$ C) $Z = Xy$ D) $Z = X + y$

7 If $a = 0$, $b = 5$, $c = 2$, then the numerical value of : $a^2b + ac =$ ....
 A) 0   B) 2   C) 7   D) 10

8 If $a = 0$, $b = 5$, $c = 2$, then the numerical value of : $ab + ac =$ ....
 A) 0   B) 2   C) 7   D) 10

9 If $a = 0$, $b = 5$, $c = 2$, then the numerical value of : $abc + ab =$ ....
 A) 0   B) 2   C) 7   D) 10

10 The additive identity element in $\mathbb{Q}$ is ....
 A) 0   B) 1   C) – 1   D) 2

11 The additive neutral element in $\mathbb{Q}$ is ....
 A) 0   B) 1   C) – 1   D) 2

12 The additive inverse of zero is ....
 A) 0   B) – 5   C) 2   D) 5

13 The additive inverse of : $|-2|$ is ....
 A) – 2   B) – 5   C) 2   D) 5

14 The additive inverse of : $(\frac{-3}{4})$ is ....
 A) $\frac{3}{4}$ B) $\frac{-3}{4}$ C) $\frac{4}{5}$ D) $\frac{-4}{5}$

15 The additive inverse of : $(\frac{3}{4})$ is ....
 A) $\frac{3}{4}$ B) $\frac{-3}{4}$ C) $\frac{4}{5}$ D) $\frac{-4}{5}$

16 The additive inverse of : $(\frac{-2}{7})^{zero}$ is ....
 A) 0   B) 1   C) – 1   D) 2

Quiz B	Date :	....	الاسـم
Mark	....	**16**	....	توقيع ولى الأمر

1 The additive inverse of : $(\frac{1}{3})^2$ is ....

A) $\frac{-1}{4}$ B) $\frac{-1}{9}$ C) $\frac{-4}{9}$ D) $\frac{-4}{25}$

2 The additive inverse of : $\frac{-9}{-7}$ is ....

A) – 9/7   B) 9/7   C) –7/9   D) 7/9

3 The additive inverse of : $\frac{-7}{-9}$ is ....

A) – 9/7   B) 9/7   C) –7/9   D) 7/9

4 The value of | 1 | + | – 6 | = ...

A) 5   B) 6   C) 7   D) 8

5 The value of | 1 | + | – 7 | = ...

A) 5   B) 6   C) 7   D) 8

6 The value of | – 8 | – | – 6 | = ...

A) 2   B) 3   C) 4   D) 5

7 The remainder of $\frac{1}{3}$ from $\frac{3}{9}$ is ....

A) 2   B) 0   C) 1   D) – 1

8 The remainder of $\frac{2}{3}$ from $\frac{6}{9}$ is ....

A) 2   B) 0   C) 1   D) – 1

9 The remainder of $\frac{1}{2}$ from $\frac{7}{14}$ is ....

A) 2   B) 0   C) 1   D) – 1

10 $\frac{6X}{7} - \frac{X}{7} =$ ....

A) 5/7   B) 5X/7   C) 3X/7   D) 4X/7

11 $-| -7/2 |$ .... The additive of 7/2

A) <   B) >   C) =

12 $| -7/2 |$ .... The additive of 7/2

A) <   B) >   C) =

13 If A – $\frac{3}{5}$ = 0 , then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

14 If A + $\frac{5}{3}$ = 0 , then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

15 The number 0.9 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

16 $0.\dot{6}$ = ...

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

Quiz C	Date :	....	الاسم
Mark	....	16	....	توقيع ولى الأمر

1 $0.\overset{..}{15}$ = ...

     A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

2 $0.\overset{..}{18}$ = ...

     A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

3   If : $\frac{2}{5} = \frac{X}{15}$ then X = ...

     A) 25   B) 6   C) 15   D) 45

4   If : $\frac{X}{36} = \frac{5}{12}$ then X = ...

     A) 25   B) 4   C) 15   D) 45

5   If : $\frac{X}{72} = \frac{5}{8}$ then X = ...

     A) 25   B) 4   C) 15   D) 45

6   If $\frac{X}{Y} = 1$, then $6X - 6Y$ = ...

     A) 5   B) 6   C) 0   D) 9

7   If $\frac{X}{Y} = 1$, then $7X - 7Y$ = ...

     A) 5   B) 6   C) 7   D) 0

8   The rational number $\frac{X-1}{X-9} = 0$, then X = ...

     A) 1   B) 2   C) 3   D) 4

9   The rational number $\frac{X-2}{X-9} = 0$, then X = ...

     A) 1   B) 2   C) 3   D) 4

10   If $\frac{X+1}{X+9} = 0$, then the value of X is ....

     A) – 1   B) – 2   C) – 3   D) – 4

11   If $\frac{X-2}{X-3}$ is a rational number , then $X \neq$ ....

     A) 1   B) 2   C) 3   D) 4

12   If $\frac{X-2}{X-4}$ is a rational number , then $X \neq$ ....

     A) 1   B) 2   C) 3   D) 4

13   If $\frac{X-2}{X-5}$ is a rational number , then $X \neq$ ....

     A) 5   B) 6   C) 7   D) 8

14   If $\frac{X+1}{X-5} \in \mathbb{Q}$, then $X \neq$ ....

     A) 3   B) 4   C) 5   D) 7

15   The number $\frac{X+7}{X-7} \in \mathbb{Q}$, if $X \neq$ ....

     A) 3   B) 4   C) 5   D) 7

16   The number $\frac{X+7}{X-5} \in \mathbb{Q}$, if $X \neq$ ....

     A) 3   B) 4   C) 5   D) 7

Quiz D	Date :	....	الاســم
Mark	....	21	....	توقيع ولى الأمر

1 $3\frac{1}{4} \times$ .... $= 1$

     A) $\frac{2}{3}$ B) $\frac{2}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$

2 $4\frac{1}{5} \times$ .... $= 1$

     A) $\frac{2}{3}$ B) $\frac{2}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$

3   If : $\frac{a}{b} = 60$, then $\frac{a}{2b} =$ ....

     A) 30   B) 120   C) 20   D) 180

4   If : $\frac{a}{b} = 60$, then $\frac{a}{3b} =$ ....

     A) 30   B) 120   C) 20   D) 180

5   If : $\frac{a}{b} = \frac{1}{2}$, then $\frac{2a}{b} =$ ....

     A) 1   B) 1/6   C) 20   D) 4

6   If : $\frac{a}{b} = \frac{1}{2}$, then $\frac{a}{3b} =$ ....

     A) 1   B) 1/6   C) 20   D) 4

7   If : $\frac{a}{b} = \frac{2}{3}$, then $\frac{3a}{2b} =$ ....

     A) 1   B) 1/6   C) 20   D) 4

8 $\frac{2}{5} X = 10$, then $\frac{1}{5} X =$ ....

     A) 5   B) 15   C) 20   D) 30

9 $\frac{2}{5} X = 10$, then $\frac{3}{5} X =$ ....

     A) 5   B) 15   C) 20   D) 30

10 $\frac{2}{5} X = 10$, then $\frac{4}{5} X =$ ....

     A) 5   B) 15   C) 20   D) 30

11 $\frac{2}{5} X = 20$, then $\frac{3}{5} X =$ ....

     A) 5   B) 15   C) 20   D) 30

12 $3 X = 42$, then $\frac{1}{7} X =$ ....

     A) 2   B) 4   C) 6   D) 8

13 $3 X = 42$, then $\frac{2}{7} X =$ ....

     A) 2   B) 4   C) 6   D) 8

14 $3 X = 42$, then $\frac{3}{7} X =$ ....

     A) 2   B) 4   C) 6   D) 8

15 $3 X = 42$, then $\frac{5}{7} X =$ ....

     A) 2   B) 4   C) 6   D) 10

16   The necessary condition to make $\frac{X-2}{X+2}$ a rational number is $X \neq$ ....

	A) – 1	B) – 2	C) 3	D) 4
17	The necessary condition to make $\frac{X+3}{X-3}$ a rational number is $X \neq$			
	A) – 1	B) – 2	C) 3	D) 4
18	The necessary condition to make $\frac{X+4}{X-4}$ a rational number is $X \neq$			
	A) – 1	B) – 2	C) 3	D) 4
19	The quotient of dividing 2.25 ÷ 1.5 = ...			
	A) 1.5	B) 0.15	C) 15	D) 150
20	The quotient of dividing 22.5 ÷ 1.5 = ...			
	A) 1.5	B) 0.15	C) 15	D) 150
21	If 7 a = 35 , ab = 1 , then b = ...			
	A) 1/5	B) 1/7	C) 1/9	D) 1/3

[C] : Essay Problems : -

1	Find the result of the following using the highest common factor : $(18)^2 – 9 \times 18 + 18$ (Calculated is not allowed) 2017 Exam (6) Question (3) (a)
2	By using the highest common factor , find the result of : $(17)^2 – 8 \times 17 + 17$ 2017 Exam (14) Question (3) (b)
3	Find in the simplest form the value of : $\left(-\frac{18}{5} \div \frac{9}{35}\right) \times \left(-\frac{3}{7}\right)$ 2018 Exam (4) Question (4) (c)
4	Use the distribution property to find : $\frac{18}{5} \times \frac{25}{9} + \left(-\frac{3}{7}\right) \times \frac{25}{9}$ 2018 Exam (14) Question (3) (a)
5	Use the distribution property to find : $\frac{2}{7} \times \frac{1}{3} + \frac{2}{7} \times \frac{3}{4} - \frac{2}{7}$ 2018 Exam (8) Question (3) (a)
6	Use the distribution property to find : $\frac{3}{7} \times 2 + \frac{3}{7} \times 9 - \frac{3}{7} \times 4$ 2018 Exam (2) Question (3) (a)
7	If $a = \frac{1}{2}$, $b = -\frac{1}{3}$, $c = \frac{3}{4}$, Find the value of : $(a + b) \div c$ 2018 Exam (1) Question (4) (c)
8	If $X = -\frac{1}{3}$, $y = \frac{3}{4}$, $Z = - 3$, Find the value of : $X y – y Z$ 2018 Exam (9) Question (3) (a)

Exercises

Quiz	A	Date :	....	الاسم
Mark	....	**14**	....	توقيع ولى الأمر

1 Which of the following is the value of X which : $X < 1 < \frac{1}{X}$

A) 1   B) –1   C) 1/3   D) – 1/3

2 The rational number lying at the half way between 1/2 and 5/8 ....

A) 5/12   B) 9/16   C) zero   D) 5/8

3 The number that lies halfway between – 1 1/2 and 1.5 ....

A) 3/8   B) 1/2   C) 5/4   D) zero

4 The rational number in half way between 1/5 and 4/5 ....

A) 5/14   B) 7/10   C) 1/2   D) 3/11

5 Number lying one Fifth between 1/4 and 2/5 from smaller ....

A) 3/8   B) 7/25   C) 8/25   D) 9/25

6 1/9 of 27 is ....

A) 9   B) 3   C) 8   D) 4

7 The multiplicative inverse of $(\frac{2}{3})^2$ is ....

A) 4/9   B) 9/4   C) – 1   D) 1

8 $4\frac{1}{5} \times$ .... $= 1$

A) $\frac{2}{3}$ B) $\frac{2}{7}$ C) $\frac{4}{13}$ D) $\frac{5}{21}$

9 If 7 a = 35 , ab = 1 , then b = ...

A) 1/5   B) 1/7   C) 1/9   D) 1/3

10 The additive inverse of : | – 2 | is ....

A) – 2   B) – 5   C) 2   D) 5

11 – | –7/2 | .... The additive of 7/2

A) <   B) >   C) =

12 $0.\dot{3} =$ ....

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

13 If $\frac{X}{Y} = 1$, then 2 X – 2 Y = ...

A) 1   B) 2   C) 0   D) 4

14 The rational number $\frac{X-4}{X-9} = 0$, then X = ...

A) 1   B) 2   C) 3   D) 4

الاسـم		Quiz B	Date :	....
توقيع ولى الأمر		Mark	....	16	....

1 The necessary condition to make $\frac{7}{X-3}$ a rational number is X $\neq$ ....
   A) -3 B) -5 C) 3   D) 5

2 The smallest fraction of the following is ....
   A) $\frac{1}{2}$ B) $\frac{3}{40}$ C) $\frac{5}{8}$ D) $\frac{7}{16}$

3 If $\triangle + \square = 20$, $\triangle + \triangle + \square = 25$, then $\triangle = $ ....
   A) 5   B) 10   C) 15   D) 20

4 The rational number lying at the half way between 1/2 and $-1/2$ ....
   A) 5/12   B) 9/16   C) zero   D) 5/8

5 The rational number half way between 1/3 and 5/9 ....
   A) 4/9   B) 1/2   C) 13 / 30   D) 3/5

6 The rational number in half way between 1/7 and 6/7 ....
   A) 5/14   B) 7/10   C) 1/2   D) 3/11

7 Number lying one Fifth between 1/4 and 3/5 from smaller ....
   A) 3/8   B) 7/25   C) 8/25   D) 9/25

8 The number which has no multiplicative inverse ....
   A) 0   B) 1   C) -1 D) 2

9 The multiplicative inverse of $(\frac{1}{2})^0$ is ....
   A) 0   B) 1   C) -1 D) 2

10 If : $\frac{a}{b} = 60$, then $\frac{a}{2b} = $ ....
   A) 30   B) 120   C) 20   D) 180

11 If $5a = 35$, $ab = 1$, then b = ...
   A) 1/5   B) 1/7   C) 1/9   D) 1/3

12 The additive inverse of : $|-5|$ is ....
   A) -2 B) -5 C) 2   D) 5

13 $|-7/2|$ .... The additive of 7/2
   A) <   B) >   C) =

14 $0.\dot{6} = $ ....
   A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

15 If $\frac{X}{Y} = 1$, then $3X - 3Y = $ ....
   A) 1   B) 2   C) 3   D) 0

16 The number $\frac{1}{X}$ is a rational, then X $\neq$ ....
   A) 1   B) 2   C) 3   D) zero

Quiz C	Date :	....	الاسـم
Mark	....	**16**	....	توقيع ولى الأمر

1 The necessary condition to make $\frac{7}{X-5}$ a rational number is $X \neq$ ....
A) – 3   B) – 5   C) 3   D) 5

2 The smallest fraction of the following is ....
A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{16}$ D) $\frac{7}{16}$

3 If $\triangle + \square = 20$, $\triangle + \triangle + \square = 30$, then $\triangle =$ ....
A) 5   B) 10   C) 15   D) 20

4 The rational number lying at the half way between 1/2 and 6/8 ....
A) 5/12   B) 9/16   C) zero   D) 5/8

5 The rational number half way between 1/4 and 3/4 ....
A) 4/9   B) 1/2   C) 13 / 30   D) 3/5

6 Number lying one third between 5 and 8 from smaller ....
A) 6   B) 7   C) 8   D) 9

7 Number lying one Fifth between 1/4 and 4/5 from smaller ....
A) 3/8   B) 7/25   C) 8/25   D) 9/25

8 The rational number which has no multiplicative inverse ....
A) 0   B) 1   C) – 1   D) 2

9 The multiplicative inverse of 0.5 is ....
A) 0   B) 1   C) – 1   D) 2

10 If : $\frac{a}{b} = 60$, then $\frac{a}{3b} =$ ....
A) 30   B) 120   C) 20   D) 180

11 If a = 0 , b = 5 , c = 2 , then the numerical value of : a b + a c = ...
A) 0   B) 2   C) 7   D) 10

12 The additive inverse of : $(\frac{1}{2})^2$ is ....
A) 0   B) 1   C) – 1   D) 2

13 $- | 7/2 |$ .... The additive of 7/2
A) <   B) >   C) =

14 $0.1\ddot{5} =$ ....
A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

15 If $\frac{X}{Y} = 1$, then $4X - 4Y =$ ....
A) 0   B) 2   C) 3   D) 4

16 If $\frac{X-3}{X-2}$ is a rational number , then $X \neq$ ....
A) 1   B) 2   C) 3   D) 4

Quiz D	Date :	....	الاسم
Mark	....	15	....	توقيع ولى الأمر

1 The rational number lying at the half way between 1/2 and 1/3 ....

A) 5/12　　　　B) 9/16　　　　C) zero　　　　D) 5/8

2 The number that lies halfway between 3/5 and 2/5 ....

A) 3/8　　　　B) 1/2　　　　C) 5/4　　　　D) zero

3 The rational number in half way between 3/5 and 4/5 ....

A) 5/14　　　　B) 7/10　　　　C) 1/2　　　　D) 3/11

4 Number lying one Fifth between 1/4 and 7/8 from smaller ....

A) 3/8　　　　B) 7/25　　　　C) 8/25　　　　D) 9/25

5 1/3 of 27 is ....

A) 9　　　　B) 3　　　　C) 8　　　　D) 4

6 The multiplicative inverse of − 1 is ....

A) 0　　　　B) 1　　　　C) − 1　　　　D) 2

7 $3\frac{1}{4} \times$ .... $= 1$

A) $\frac{2}{3}$　　　　B) $\frac{2}{7}$　　　　C) $\frac{4}{13}$　　　　D) $\frac{5}{21}$

8 $3X = 42$, then $\frac{5}{7} X =$ ....

A) 2　　　　B) 4　　　　C) 6　　　　D) 10

9 The additive inverse of zero is ....

A) 0　　　　B) − 5　　　　C) 2　　　　D) 5

10 $\frac{1}{2} + \frac{1}{3} =$ ....

A) $\frac{5}{6}$　　　　B) $\frac{1}{15}$　　　　C) $\frac{5}{4}$　　　　D) $\frac{-2}{21}$

11 The number 0.5 = ... (in the rational form)

A) $\frac{3}{10}$　　　　B) $\frac{5}{10}$　　　　C) $\frac{7}{10}$　　　　D) $\frac{9}{10}$

12 If : $\frac{X}{24} = \frac{5}{12}$ then X = ...

A) − 20　　　　B) 4　　　　C) 10　　　　D) 15

13 The rational number $\frac{X-3}{X-9} = 0$, then X = ...

A) 1　　　　B) 2　　　　C) 3　　　　D) 4

14 If $\frac{5}{X-4} \in \mathbb{Q}$, then X ≠ ....

A) 3　　　　B) 4　　　　C) 5　　　　D) 7

15 The smallest fraction of the following is ....

A) $\frac{1}{12}$　　　　B) $\frac{3}{4}$　　　　C) $\frac{5}{8}$　　　　D) $\frac{7}{16}$

Quiz	E	Date :	....	الاســم
Mark	....	**15**	....	توقيع ولى الأمر

1. The necessary condition to make $\frac{7}{X+3}$ a rational number is $X \neq$ ....

A) – 3   B) – 5   C) 3   D) 5

2. The smallest fraction of the following is ....

A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{8}$ D) $\frac{7}{16}$

3. If $a + \frac{2}{a} = 3\frac{2}{3}$, then a = ...

A) 3   B) 5   C) 7   D) 9

4. The number that lies halfway between 1/4 and 1/2 ....

A) 3/8   B) 1/2   C) 5/4   D) zero

5. The rational number half way between 1/5 and 2/3 ....

A) 4/9   B) 1/2   C) 13 / 30   D) 3/5

6. Number lying one third between 5 and 11 from smaller ....

A) 6   B) 7   C) 8   D) 9

7. The quotient of dividing 2.25 + 1.5 = ...

A) 1.5   B) 0.15   C) 15   D) 150

8. The multiplicative identity element in Q is ....

A) 0   B) 1   C) – 1   D) 2

9. If : $\frac{3}{4} \times n = 1$, then n = ...

A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$

10. If : $\frac{a}{b} = \frac{1}{2}$, then $\frac{2a}{b} =$ ....

A) 1   B) 1/6   C) 20   D) 4

11. If a = 0 , b = 5 , c = 2 , then the numerical value of : a bc + a b = ...

A) 0   B) 2   C) 7   D) 10

12. The value of $|-8| - |-3| =$ ....

A) 2   B) 3   C) 4   D) 5

13. If $A + \frac{5}{3} = 0$, then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

14. $0.1\dot{8} =$ ....

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{5}{33}$ D) $\frac{2}{11}$

15. If $\frac{X}{Y} = 1$, then 9 X – 9 Y = ...

A) 5   B) 6   C) 0   D) 9

Homework

Quiz A	Date :	.... الاسـم
Mark	 13	.... توقيع ولى الأمر

1 If : $\frac{15}{X} = \frac{-3}{4}$ then X = ...
  A) – 20　　　　　B) 4　　　　　C) 10　　　　　D) 15

2 The rational number $\frac{X-1}{X-9} = 0$, then X = ...
  A) 1　　　　　B) 2　　　　　C) 3　　　　　D) 4

3 If $\frac{7}{3-X} \in \mathbb{Q}$, then X $\neq$ ....
  A) 3　　　　　B) 4　　　　　C) 5　　　　　D) 7

4 If : $X + \frac{2}{X} = 7 + \frac{2}{7}$, then X = ...
  A) 2　　　　　B) 3　　　　　C) 7　　　　　D) 5

5 Which of the following is lies between : $\frac{7}{20}$, $\frac{7}{25}$?
  A) $\frac{7}{10}$　　　　　B) $|-\frac{7}{11}|$　　　　　C) $\frac{7}{15}$　　　　　D) $\frac{7}{22}$

6 The number that lies halfway between 2/3 and 1 5/6 ....
  A) 3/8　　　　　B) 1/2　　　　　C) 5/4　　　　　D) zero

7 The rational number in half way between 2/7 and 3/7 ....
  A) 5/14　　　　　B) 7/10　　　　　C) 1/2　　　　　D) 3/11

8 Number lying one third between 5 and 17 from smaller ....
  A) 6　　　　　B) 7　　　　　C) 8　　　　　D) 9

9 $|-5| + 2 \times 3 - |1| =$ ....
  A) 10　　　　　B) 9　　　　　C) 8　　　　　D) 7

10 The multiplicative inverse of 1 is ....
  A) 0　　　　　B) 1　　　　　C) – 1　　　　　D) 2

11 $2\frac{1}{3} \times$ .... = 1
  A) $\frac{2}{3}$　　　　　B) $\frac{3}{7}$　　　　　C) $\frac{4}{13}$　　　　　D) $\frac{5}{21}$

12 $\frac{2}{5} X = 10$, then $\frac{3}{5} X =$ ....
  A) 5　　　　　B) 15　　　　　C) 20　　　　　D) 30

13 The additive neutral element in $\mathbb{Q}$ is ....
  A) 0　　　　　B) 1　　　　　C) – 1　　　　　D) 2

Quiz	B	Date :	....	الاســـم
Mark	....	**15**	....	توقيع ولى الأمر

1. If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$ ....

A) 5   B) 6   C) 7   D) 9

2. If : $X + \frac{2}{X} = 3 + \frac{2}{3}$, then $X =$ ....

A) 2   B) 3   C) 4   D) 5

3. Which of the following is lies between : $\frac{7}{11}$, $\frac{7}{20}$? ....

A) $\frac{7}{10}$ B) $|-\frac{7}{11}|$ C) $\frac{7}{15}$ D) $\frac{7}{22}$

4. If $a + \frac{2}{a} = 5\frac{2}{5}$, then $a =$ ....

A) 3   B) 5   C) 7   D) 9

5. The number that lies halfway between 1/6 and 5/6 ....

A) 3/8   B) 1/2   C) 5/4   D) zero

6. The rational number half way between 2/5 and 4/5 ....

A) 4/9   B) 1/2   C) 13 / 30   D) 3/5

7. The rational number lying at the half way between 1/2 and 5/8 ....

A) 5/12   B) 9/16   C) zero   D) 5/8

8. Number lying one third between 5 and 14 from smaller ....

A) 6   B) 7   C) 8   D) 9

9. Zero ÷ (15) = ...

A) 1.5   B) 0.15   C) 15   D) zero

10. The multiplicative neutral element in $\mathbb{Q}$ is ....

A) 0   B) 1   C) – 1   D) 2

11. If : $\frac{3}{5} \times n = 1$, then $n =$ ....

A) $\frac{4}{3}$ B) $\frac{5}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{2}$

12. $\frac{2}{5} X = 10$, then $\frac{1}{5} X =$ ....

A) 5   B) 15   C) 20   D) 30

13. The additive identity element in $\mathbb{Q}$ is ....

A) 0   B) 1   C) – 1   D) 2

14. The remainder of $\frac{1}{2}$ from $\frac{7}{14}$ is ....

A) 2   B) 0   C) 1   D) – 1

15. If $A - \frac{5}{3} = 0$, then $A =$ ....

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

Quiz C	Date :	....	الاسم
Mark	....	**15**	....	توقيع ولى الأمر

1 The number 0.3 = ... (in the rational form)

A) $\frac{3}{10}$ B) $\frac{5}{10}$ C) $\frac{7}{10}$ D) $\frac{9}{10}$

2 If : $\frac{2}{5} = \frac{X}{10}$ then X = ...

A) – 20   B) 4   C) 10   D) 15

3 The rational number $\frac{X-2}{X-9} = 0$, then X = ...

A) 1   B) 2   C) 3   D) 4

4 If $\frac{X+4}{X-3} \in \mathbb{Q}$, then X $\neq$ ....

A) 3   B) 4   C) 5   D) 7

5 If : $X + \frac{2}{X} = 5 + \frac{2}{5}$, then X = ...

A) 2   B) 3   C) 4   D) 5

6 The remainder of $\frac{3}{4}$ from $\frac{21}{28}$ is ....

A) 2   B) 0   C) 1   D) – 1

7 Which of the following is the value of X which : $X < 1 < \frac{1}{X}$

A) 1   B) –1   C) 1/2   D) – 1/3

8 The multiplicative inverse of 1 is ....

A) 0   B) 1   C) – 1   D) 2

9 If : $\frac{a}{b} = 60$, then $\frac{a}{3b} = $ ....

A) 30   B) 120   C) 20   D) 180

10 The additive inverse of zero is ....

A) 0   B) – 5   C) 2   D) 5

11 If A + $\frac{5}{3} = 0$, then A = ...

A) 3/5   B) – 3/5   C) – 5/3   D) 5/3

12 If $\frac{X}{Y} = 1$, then 2 X – 2 Y = ...

A) 1   B) 2   C) 0   D) 4

13 If $\frac{7}{3-X} \in \mathbb{Q}$, then X $\neq$ ....

A) 3   B) 4   C) 5   D) 7

14 The smallest fraction of the following is ....

A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{5}{16}$ D) $\frac{7}{16}$

15 The rational number lying at the half way between 1/2 and 5/8 ....

A) 5/12   B) 9/16   C) zero   D) 5/8

Quiz D	Date :	....	الاسم
Mark	 27	....	توقيع ولى الأمر

1 The rational number lying at the half way between 1/2 and 1/3 ....
A) 5/12   B) 9/16   C) zero   D) 5/8

2 The rational number half way between 1/5 and 2/3 ....
A) 4/9   B) 1/2   C) 13 / 30   D) 3/5

3 Number lying one Fifth between 1/4 and 2/5 from smaller ....
A) 3/8   B) 7/25   C) 8/25   D) 9/25

4 The multiplicative neutral element in $\mathbb{Q}$ is ....
A) 0   B) 1   C) – 1   D) 2

5 If : $\frac{a}{b} = 60$, then $\frac{a}{2b} =$ ....
A) 30   B) 120   C) 20   D) 180

6 The additive neutral element in $\mathbb{Q}$ is ....
A) 0   B) 1   C) – 1   D) 2

7 $-| 7/2 |$ .... The additive of 7/2
A) <   B) >   C) =

8 If $\frac{X-2}{X-9}$ is a rational number , then $X \neq$ ....
A) 5   B) 6   C) 7   D) 9

9 The smallest fraction of the following is ....
A) $\frac{1}{2}$ B) $\frac{3}{40}$ C) $\frac{5}{8}$ D) $\frac{7}{16}$

10 The rational number lying at the half way between 1/2 and 1/3 ....
A) 5/12   B) 9/16   C) zero   D) 5/8

11 The rational number half way between 1/5 and 2/3 ....
A) 4/9   B) 1/2   C) 13 / 30   D) 3/5

12 Number lying one Fifth between 1/4 and 2/5 from smaller ....
A) 3/8   B) 7/25   C) 8/25   D) 9/25

13 The rational number lying at the half way between 1/2 and 5/8 ....
A) 5/12   B) 9/16   C) zero   D) 5/8

14 The rational number half way between 2/5 and 4/5 ....
A) 4/9   B) 1/2   C) 13 / 30   D) 3/5

15 Number lying one Fifth between 1/4 and 3/5 from smaller ....
A) 3/8   B) 7/25   C) 8/25   D) 9/25

16 The multiplicative inverse of – 1 is ....
A) 0   B) 1   C) – 1   D) 2

17 If : $\frac{a}{b} = \frac{1}{2}$, then $\frac{2a}{b} =$ ....

A) 1	B) 1/6	C) 20	D) 4

18	The additive inverse of : $\| -2 \|$ is			
	A) – 2	B) – 5	C) 2	D) 5

19	If $A - \frac{5}{3} = 0$, then A = ...			
	A) 3/5	B) – 3/5	C) – 5/3	D) 5/3

20	If $\frac{X}{Y} = 1$, then $3X - 3Y$ = ...			
	A) 1	B) 2	C) 3	D) 0

21	The rational number lying at the half way between 1/2 and – 1/2			
	A) 5/12	B) 9/16	C) zero	D) 5/8

22	The rational number in half way between 2/7 and 3/7			
	A) 5/14	B) 7/10	C) 1/2	D) 3/11

23	Number lying one Fifth between 1/4 and 4/5 from smaller			
	A) 3/8	B) 7/25	C) 8/25	D) 9/25

24	The rational number lying at the half way between 1/2 and 6/8			
	A) 5/12	B) 9/16	C) zero	D) 5/8

25	The rational number in half way between 3/5 and 4/5			
	A) 5/14	B) 7/10	C) 1/2	D) 3/11

26	The quotient of dividing 2.25 ÷ 1.5 = ...			
	A) 1.5	B) 0.15	C) 15	D) 150

27	The multiplicative inverse of $(\frac{-2}{3})^2$ is			
	A) 4/9	B) 9/4	C) – 1	D) 1

[C] : Essay Problems : -

1	Find the rational number that lies halfway between : $\frac{1}{2}$ and $\frac{4}{5}$
2	Find the rational number that lies halfway between : $\frac{1}{2}$ and $\frac{1}{5}$
3	Find the rational number that lies one third of the way between : $\frac{1}{4}$ and $\frac{7}{8}$ from the side of the smaller
4	Find the rational number that lies one fourth of the way between : $-\frac{1}{4}$ and $-\frac{7}{8}$ from the side of the smaller
5	Find the rational number that lies one fifth of the way between : $\frac{1}{4}$ and $\frac{7}{8}$ from the side of the smaller
6	Find the rational number that is $\frac{2}{5}$ the way from $-1\frac{2}{5}$ to $1\frac{3}{5}$ in the simplest form.

Alg.

Exercise (1)

[1] Complete :

1) Rational number is ....

2) The set of integer is ....

3) If $\dfrac{a}{b}$ is rational then b ≠ ....

4) The number $\dfrac{4}{x-3}$ is rational if x ≠ ....

5) The number $\dfrac{x+5}{x-5}$ is rational if x ≠ ....

6) The rational number $\dfrac{5-x}{x-4} = 0$ if x = ...

7) The rational number $\dfrac{a}{b}$ is an integer if ....

8) Express of 0.57 as rational number is simplest form ....

9) The rational number $\dfrac{x}{-4}$ is negative if x ....zero .

10) If $\dfrac{a}{b}$ is rational number and ab = zero then a = ...

11) Write the rational number $\dfrac{7}{11}$ as decimals ....

Exercise (2)

[1] Represent each of the following on number line :

a) $\dfrac{-7}{4}$ 　　　　　　 b) $1\dfrac{1}{5}$ 　　　　　　 c) $\dfrac{1}{2}$

[2] Write the correct sign (< , > , =) :

a) Every positive rational number ……………..zero .

b) Every negative rational number ……………zero .

c) $\left|\dfrac{-13}{2}\right|$ ………….. $6\dfrac{1}{2}$

d) $\dfrac{-9}{3}$ ………...-3

e) $\left|\dfrac{15}{2}\right|$ ……….$7\dfrac{1}{2}$

f) 0.5 ……….. 0.5$^{\bullet}$

g) $\left|\dfrac{-3}{2}\right|$ …………. $\dfrac{1}{2}$

[3] Write two rational number lying between :

1) $\dfrac{1}{3}$ and $\dfrac{4}{5}$ 　　　　 2) $\dfrac{-1}{2}$ and 1 　　　　 3) 0.3 and $\dfrac{4}{5}$

[4] Complete :

1) Between each two successive integers there is ………………..

2) The opposite rational number $\dfrac{1}{3}$ on number line …………...

3) The number of integers lying between $\dfrac{5}{7}$ and $\dfrac{8}{11}$ are ……………

[5] Write the rational number that equal $\dfrac{3}{4}$ and the sum of terms 28 .

Exercise (3)

[1] Complete :

1) The additive identity element in φ is ....

2) The additive inverse of number $\frac{3}{5}$ is ....

3) The additive inverse of $(\frac{2}{3})^{zero}$ is ....

4) The additive inverse of $\left|\frac{-4}{5}\right|$ is ....

5) The additive inverse of number zero ....

6) The additive inverse of -0.5 is ....

7) The remainder of subtracting $\frac{1}{5}$ from $\frac{6}{5}$ = ...

8) The remainder of subtracting $\frac{1}{3}$ from $\frac{4}{3}$ ....

9) The remainder of subtracting $\frac{-3}{2}$ from zero ....

10) A + $\frac{7}{8}$ = zero then A = ...

11) If $(A + \frac{1}{4})$ is additive inverse of number $\frac{3}{4}$ then A = ...

12) If X = 2 , Y = 3 and Z = 4 then $\frac{X}{Y} - \frac{Z}{X}$ = ...

[2] Using the number line to find result :

a) $\frac{1}{3} + \frac{7}{3}$ =

b) $\frac{5}{7} + \frac{1}{7}$ =

[3] Using the addition properties in :

a) $\frac{5}{8} + (\frac{-3}{4}) + \frac{3}{8} + \frac{3}{4}$

b) $7\frac{1}{4} + (-11\frac{1}{4})$

c) $\frac{2}{3} + \frac{4}{5} + \frac{3}{4}$

[4] If X = $\frac{5}{6}$, Y = $\frac{-1}{3}$, Z = $\frac{1}{2}$ find :

a) $X + Z$

b) $X - Y$

c) $(X + Z)$

d) $(X + Y) - Z$

Exercise (4)

[1] Complete :

1) The multiplicative identity of the rational no. is ……………

2) The multiplicative inverse of no. $\frac{3}{7}$ is ……………

3) The multiplicative inverse $(\frac{-3}{5})^{zero}$ is ……………

4) The rational no. $\frac{a-1}{5}$ has multiplicative inverse if $a =$ ……………

5) The rational no. has multiplicative inverse is ……………

6) $\frac{2}{3} \times (\frac{-4}{5}) = \frac{-4}{5} \times$ ……………

7) If $\frac{a}{b} = 80$ then $\frac{a}{2b} =$ ……………

8) $\frac{X}{Y} = \frac{2}{3}$ then $\frac{3X}{2Y} =$ ……………

9) $\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times$ …………… $\times \frac{50}{51} =$ ……………

10) $\frac{-7}{3} \times (\frac{-3}{7}) = n$, then n = …………

11) $\frac{-5}{3} \times$ ………… $= 0$

12) ………… $\times \frac{19}{3} = 1$

[2] Using properties of following :

1) $\frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$

2) $\dfrac{-3}{7} \times 8 + 5 \times (\dfrac{-3}{7}) + (\dfrac{-3}{7}) \times 9$

3) $\dfrac{27}{11} \times \dfrac{1}{4} - \dfrac{27}{11} \times \dfrac{1}{4} + \dfrac{27}{11} \times 9$

[3] If $X = \dfrac{3}{2}$, $Y = \dfrac{-1}{4}$ and $Z = -2$

a) $\dfrac{1}{XYZ}$

b) $\dfrac{X}{Y} - \dfrac{Z}{Y}$

[4] Find the middle rational no. lying between :

a) $\dfrac{3}{8}$, $\dfrac{5}{8}$

b) $\dfrac{-1}{2}$, $\dfrac{-3}{4}$

c) zero , $\dfrac{2}{5}$

[5] Find the rational number lying at :

a) One fourth of way between $\dfrac{5}{7}$, $\dfrac{-3}{7}$

b) One tenth of way between $\dfrac{-1}{2}$, $\dfrac{-3}{5}$

Unit Two

[1] Complete :

1) The degree of term $3 X^2 Y$ is ……………its coefficient is ……………..

2) The coefficient of algebraic term $\frac{2}{3} X^4 Y Z^3$ is ……………and its degree ……………..

3) The degree of an absolute term in algebraic expression …………………..

4) $3a^5b$ number of terms …………..name is …………….. , degree is ……………..

5) $5 X^3 - 7 X + 4$ number of terms ……………name ……………. degree is ……………

6) The coefficient of the algebraic term X is …………..and its degree is ……………

7) If the degree of the algebraic term $5 X^n Y^2$ is 5 then $n =$ ……………..

8) If the degree of algebraic term Y^{m+} is the degree of a algebric term $5 X^2Y^4$ then

 in = …………….……..

Sheet (7)

[1] Find the result of each of following :

1) $3X + 2X$ 2) $5a^2 + 3a^2$

3) $\dfrac{3X}{7} \quad \dfrac{X}{7}$ 4) $2 X^2 Y + 3Y X^2$

5) Subtract Y^2 from $\cdot 3 Y^2$

6) What is increase of $3a^2 b$ than $a^2 b$ is ?

7) What is decrease of $3ab$ than $2ab$?

8) Find the sum of :

a) $3a - 4b + 6c$ b) $3a - 7b - 5c + 2$ c) $5x + 2y \quad z + 2$

   $5a + 6b \quad 2c$ $a + 4b + c - 5$ $7x + y \quad 32 + 3$

                          $2x \quad 5y + 4z \cdot 1$

[2] Find the sum of following :

1) $3X - 2Y$, $X + 2Y - 2$

2) $2a^2 b - 3ab^2 + b^3$, $- a^2 b + b^3$

3) $3X - 4X^2 + X^3$, $2X^2 - 6X^2 - 6X + 5$, $7X + 4 - X^3$

[3] Reduce each of the following :

1) $5X - 3X^2 + 4 - 7X^2 - 6X - 1$

2) $6X^2Y - 4XY^2 + 2XY^2 - 5X^2Y + 2X^2Y^2$

3) $5X^2 - 2X + 8 - 7X - 3 + X^2$

4) $-a^2 - 5ab + 4b^2 - 2 - 3a^2 + 2ab - 2b^2 - 7$

Sheet (8)

[1] Simplify :

1) $4(X - 3) =$ ....

2) $a(a - 2) =$ ....

3) $-3k(2k^2 - 3k - 7) =$ ....

4) $-2c(7 - 3c) =$ ....

5) $2X^2Y(2X^2 - 3XY + Y^2) =$ ....

6) $Lm^2(L^2 \quad 3mL \quad 4m^2) =$ ....

7) $(3X + 4)(2X + 5) =$ ....

8) $(5X + 1)(3X + 2) =$ ....

9) $(2X + 5Y(2X - 5Y) =$ ....

10) $(X - 4)(X + 4) =$ ....

11) $(2X + Y)^2 =$ ....

12) $(4X + 5Y)^2 =$ ....

13) $3(m - 5)(m + 2) =$ ....

14) $4(XY - 2)^2 =$ ....

15) $(2X^2 + 3)(X^2 - 5) - (3X^2 + 2)^2 =$ ....

[2] Find value of K :

1) $(2X + Y)^2 = 4X^2 + KXY + Y^2$ then K = ……………..

2) If $(X – Y)(2X + Y) = 2X^2 + KXY – Y^2$ then K ……………..

3) $(X – 3)(X + 3) = X^2 + K$ then K = …………..

[3] Find numerical value of following :

If X = 1 , Y = -2

1) $(2Y + 7)(3Y + 4)$

2) $(X + 4)(3X + 2)$

3) $(3X + Y)(X + 3Y)$

Sheet (8)

[1] Find the quotient :

a) $\dfrac{18 a^2}{3 a}$

b) $\dfrac{18 m^3 + 36 m^2}{-2 m^2}$

c) $\dfrac{48 X^3 - 80 mX^2}{8 X^2}$

d) $\dfrac{32 X^5 - 32 X^2 + 36 X^7}{4 X^2}$

e) $2X^2 + 13X + 15$ by $X + 5$

f) $X^3 – 27$ by $X – 3$

g) $3X^3 – 4X + 1$ by $X – 1$

h) If area of rectangle is $(2X^2 + 7X – 15)$ and length is $(X + 5)$ find perimeter if

   X = 3 cm.

Sheet (9)

Factorize by identifying the H.C.F :

a) $3 X^2 + 6 X$

b) $35 a + 10 a^2$

c) $3 X^2 + 12 X - 6$

d) $8 Y^2 - 4 X^2$

e) $3X (a + b) + 7 (a + b)$

f) $3 X^3 (X - 4) + 4 X (X - 4) + 3 (X - 4)$

g) $4 m^5 (2X + 5 Y) - 3 m (2 X + 5 Y) - 6 (2 X + 5 Y)$

h) $7 \times 123 + 7 \times 35 - 7 \times 18$

i) $6 \times 15^2 + 18 \times 15 - 24 \times 15$

Sheet (10)

1) The mode of set of values is …………………………..

2) The mode of values of 2 , 3 , 8 , 2 , 9 is ……………………

3) The mode of values 3 , 6 , 13 , 19 , 19 , 12 is ………………..

4) If the mode of values $\frac{1}{3}$, $\frac{1}{7}$, $\frac{1}{5}$, $\frac{1}{7}$ is $\frac{1}{X}$ then X = ………………..

5) If the mode of values 12 , 17 , X - 1 , 7 , 12 is 7 then X = ……………

6) If mode of values of a + 2 , a + 1 , a + 3 , a + 2 equal 12 then a = ……………

7) The median of values 4 , 8 , 3 is ……………

8) The median of values 6 , 5 , 9 , 8 is ………………

9) The median of values 8 , 17 , 4 , 6 , 10 is …………………..

10) The median of values 6 , 2 , 5 , 4 is …………………………

11) The mean of values 5 , 12 , 6 , 17 is ………………

12) The mean of values 2 , 5 , 8 , 9 , 14 , 28 is ……………………..

13) The mean of values 2 – a , 4 , 1 , 5 , 3 + a is ……………..

14) The mean of values X , X · Y , Y · X is ……………..

[2] The following table shows the number of hours that . Ali and Ahmed study daily in

a week .

Ali	7	5	8	9	8	6	4
Ahmed	8	9	7	9	9	5	5

a) find mean of studying hour for each Ali , Ahmed

b) Find median of each of them .

c) Find mode of hours of each of them .
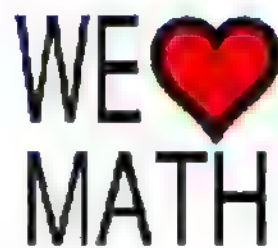
1) The set of Counting numbers $C = \{ 1, 2, 3, \ldots \ldots \}$

2) The set of Natural numbers $N = \{ 0, 1, 2, 3, \ldots \ldots \}$

3) The set of integers $Z = \{ \ldots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \ldots \}$

$$Z = \ldots \ldots \cup \ldots \ldots \cup \ldots \ldots$$

4) The set of rational number $Q = \{ x : x = \dfrac{a}{b}, a \in z, b \in z, b \neq 0 \}$

$$Q = \ldots \ldots \cup \ldots \ldots \cup \ldots$$
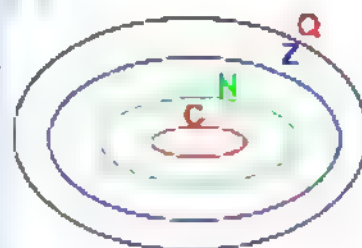
*Each integer is a rational number with denominator $= 1$

* The rational number $\dfrac{a}{b}$ is an integer if a is divisible by b

* The rational number $\dfrac{a}{b}$ is an integer if b is divisible by a

*The rational number $\dfrac{a}{b}$ is an integer if $b = 1$

*If $\dfrac{a}{b}$ is a rational number, then $b \neq 0$

*If the rational number $\dfrac{a}{b} = 0$, then $a = 0$

[1] Put the suitable sign: $\in, \notin, \subset$ or $\not\subset$:

a) $\dfrac{5}{3}$ Q

b) $\dfrac{-2}{7}$ Q

c) $\dfrac{3}{\text{zero}}$ Q

d) 0 Q

e) $\dfrac{7}{3-3}$ Q

f) $\dfrac{-10}{2}$ Q

g) 2% Q

h) 2 Q

[2]] Write the following numbers on the form of the rational number : $\frac{a}{b}$

   a) 0.15 b) 40% c) $\left|-9\frac{1}{3}\right|$ d) $0.\dot{3}$ e) $0.\dot{1}\dot{8}$

   ………   ……….   ………   ……….   ….…

[3] Write the following numbers on the percentage form:

   a) 0.30 b) $\frac{2}{5}$ c) $\left|-2\frac{1}{4}\right|$

   …………..   ……………..   …………….

[4] Write each of the following rational numbers in the form of a terminating decimal:

   1) $\frac{2}{5} = \ldots\ldots\ldots..$ 2) $-2\frac{7}{25} = \ldots\ldots\ldots..$

[5] Using a calculator , Write each of the following rational numbers in the form of a recurring decimal:

   1) $\frac{2}{3} = \ldots\ldots\ldots..$ 2) $5\frac{71}{333} = \ldots\ldots\ldots\ldots..$

[6] Why does the definition of the rational number $\frac{a}{b}$ state that b≠0 ?

   ………………………………………………………………………………………..

[7] Complete each of the following :

   1) Zero is neither ……………….. nor ……………..
   2) Each integer is …………….. ,it's denominator = ……..
   3) If $\frac{a}{b}$ is a rational , then $b \neq$ …………
   4) If $\frac{5}{a}$ is a rational number , then $a \neq$ ……………….
   5) The number $\frac{4}{X-3}$ is a rational number if $X \neq$ …………..
   6) The number $\frac{X+5}{X-5}$ is a rational number if $X \neq$ …………..
   7) The number $\frac{2}{5X}$ is a rational number if $X \neq$ …………….
   8) The rational number $\frac{5-X}{X-4} = 0$ if $X =$ …………..
   9) The rational number $\frac{X-4}{X} = 0$ if $X =$ ……………
   10) $-\frac{4}{5} = \frac{20}{X}$, then $X =$ ……………….

[8] Choose the correct answer :

1) The number $\dfrac{a-6}{a-7}$ is not a rational number if a = ...

     a) 7   b) – 7   c) 4   d) zero

2) The rational number $\dfrac{a}{b}$ is an integer if ....

     a) a < b   b) a > b   c) a is divisible by b   d) b is divisible by a

3) Express of $0.\dot{5}\dot{7}$ as a rational number in simplest form

     a) $\dfrac{57}{100}$ b) $\dfrac{75}{99}$ c) $\dfrac{575}{1000}$ d) $\dfrac{19}{33}$

4) The rational number $\left| -\dfrac{8}{25} \right| = $ ....

     a) $\dfrac{-8}{25}$ b) $-0.3\dot{2}$ c) $0.3\dot{2}$ d) 32 %

5) The number 12 % = ...

     a) 0.3   b) 1.2   c) $\dfrac{3}{25}$ d) 0.012

6) The rational number $\dfrac{X}{-4}$ is negative if X ....

     a) > zero   b) < zero   c) ≥ zero   d) = zero

7) The rational number $\dfrac{X}{-4}$ is positive if X ....

     a) > zero   b) < zero   c) ≥ zero   d) = zero

8) If $\dfrac{a}{b}$ is a rational number and a b = zero , then ....

     a) a = 0 , b ≠ 0   b) 0 ≠ , b ≠ 0   c) a = 0 , b = 0   d) a ≠ 0 , b = 0

9) If $\dfrac{15}{x} = \dfrac{-3}{4}$, then x = ...

     a) – 20   b) – 5   c) 5   d) 20

10) The number $\dfrac{5}{3} > $ ....

     a) $\dfrac{10}{3}$ b) $\dfrac{25}{9}$ c) $\dfrac{10}{6}$ d) $\dfrac{3}{5}$

[2] Comparing and ordering rational numbers.

[1] Represent each of the following numbers on the number line :

a) 4, 0 and – 4

b) $\frac{2}{5}$, 0 , $\frac{4}{5}$

c) $\frac{1}{7}$, – $\frac{2}{3}$

d) $3\frac{1}{2}$, – $1\frac{1}{5}$

[2] Write the correct sign (≤ , = or >) :

1) $\frac{-1}{2}$ .... zero

2) $-4\frac{1}{2}$ .... – 5

3) $\left|\frac{15}{2}\right|$ .... $7\frac{1}{2}$

4) $\left|\frac{-13}{2}\right|$ .... $6\frac{1}{2}$

5) $\frac{-9}{3}$ .... – 3

6) $\frac{-4}{5}$ .... $\frac{-6}{5}$

7) 1.6 .... $\left|\frac{-8}{5}\right|$

8) 0.5 .... $0.\dot{5}$

9) Every negative rational number .... Zero

10) Every positive rational number .... Zero

The density of the rational numbers

Between every two different rational numbers there are infinite of rational numbers.

[1] Write two rational numbers lying between:

1) $\frac{1}{5}$ and $\frac{4}{5}$

....

....

2) $\frac{1}{3}$ and $\frac{2}{3}$

....

....

2) $-\frac{1}{2}$ and 1

....

....

3) $\frac{1}{3}$ and $\frac{2}{7}$

....

....

[2] Identify and write four rational numbers between $\frac{3}{2}$ and $\frac{3}{4}$, such that one of the is **an integer** and the other is a rational number.

....

....

[1] write four rational numbers between $\frac{1}{2}$ and $\frac{1}{3}$

……………………………………………………………

[2] Complete with a suitable rational number.

[a] $\frac{2}{5} <$ ☐ $< \frac{3}{5}$ [c] $\frac{1}{8} <$ ☐ $< \frac{1}{4}$

[b] $-\frac{2}{3} <$ ☐ $< -\frac{1}{3}$ [d] $-\frac{2}{7} <$ ☐ $< -\frac{3}{14}$

[3] Write the rational number that equals $\frac{3}{5}$ and the sum of its terms is 24

……………………………………………………………………

……………………………………………………………………

[4] Write the rational number that equals $\frac{2}{7}$ and the sum of its terms is 45

……………………………………………………………………

……………………………………………………………………

[5] Find the rational number halfway between $\frac{3}{5}$ and $\frac{4}{5}$.

……………………………………………………………………

……………………………………………………………………

[6] Find the rational number which is lying at third way of the distance between $\frac{3}{5}$ and $\frac{4}{5}$ from the smaller.

……………………………………………………………………

……………………………………………………………………

[7] Find the rational number which is lying at third way of the distance between $\frac{3}{5}$ and $\frac{4}{5}$ from the greater.

……………………………………………………………………

……………………………………………………………………

[8] Find the rational number halfway between $\frac{3}{5}$ and $-\frac{4}{5}$

……………………………………………………………………

……………………………………………………………………

[9] Choose the correct answer :-

1) The opposite rational number to $\frac{1}{3}$ on the number line is ……

     a) $-\frac{1}{3}$ b) $\frac{2}{3}$ c) 1   d) $\frac{3}{3}$

2) The rational number which between $\frac{3}{4}$ and $\frac{4}{5}$ is ………

     a) $\frac{30}{40}$ b) $\frac{15}{20}$ c) $\frac{1}{40}$ d) $\frac{16}{20}$

3) The number of integers lying between $\frac{7}{4}$ and $\frac{11}{8}$ is ……………

     a) zero   b) 1   c) 2   d) an infinite number.

4) The necessary condition to make $\frac{7}{x+5}$ a rational number is $x \neq$ …………

     a) – 5   b) 5   c) 75   d) 7

5) $|-\frac{2}{3}|$ ………… zero.

     a) >   b) <   c) =   d) ≤
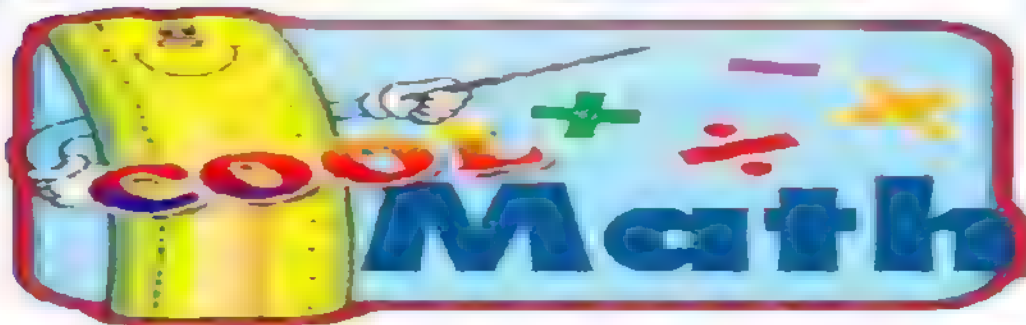
[3] Adding and subtracting rational numbers

(1) Find the sum of each of the following:

a) $\frac{2}{5} + \frac{1}{5} = $ ....

b) $\frac{-3}{8} + \frac{2}{8} = $ ....

c) $\frac{-3}{4} + \frac{3}{4} = $ ....
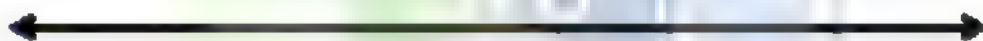
d) $\frac{2}{3} + \frac{4}{5} = $ ....

e) $\frac{3}{5} + \left(\frac{-7}{10} \right) = $ ....

*Properties of addition:

1) $a + b \in Q$ closure property
2) $a + b = b + a$ commutative property
3) $(a + b) + c = a + (b + c)$ associative property

$$(\frac{2}{5}+\frac{1}{3})+\frac{1}{2} = \frac{2}{5}+(\frac{1}{3}+\frac{1}{2})$$

4) The additive identity in Q is Zero

$$0 + 3 = 3$$

5) The additive inverse property

$$3 + (-3) = 0$$

$$-\frac{1}{3}+\frac{1}{3}=0$$
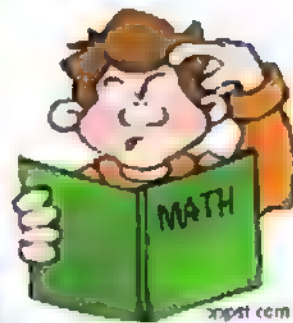
(1) Write the property of addition operation which used in each of the following:

[a] $\frac{7}{2} + \frac{9}{16} = \frac{9}{16} + \frac{7}{2}$ ....

[b] $[\frac{2}{3} + (-\frac{1}{3})] + (-\frac{1}{6}) = \frac{2}{3} + [-\frac{1}{3} + (-\frac{1}{6})]$ ....

[c] $\frac{3}{4} + (-\frac{3}{4}) = 0$ ....

[d] $\frac{5}{8} + 0 = (\frac{5}{8})$ ....

(2) Complete :-

1) The additive identity element in Q is ....

2) The additive inverse of the number $\frac{3}{5}$ is ....

3) The additive inverse of the number $\frac{-4}{7}$ is ....

4) The additive inverse of the number $(\frac{2}{3})^{zero}$ is ....

5) The additive inverse of the number $|\frac{-4}{5}|$ is ....

6) The additive inverse of the number zero is ....

7) The additive inverse of the number $- 0.5$ is ....

(3) Find the sum in simplest form by using the properties of addition operation in Q:

a) $\frac{3}{5} + \frac{1}{5} + (\frac{-3}{5}) = \dots\dots\dots\dots$

b) $\frac{2}{7} + \frac{5}{8} + \frac{3}{7} = \dots\dots\dots\dots$

(4) Find the result of each of the following:

$$\frac{a}{b} - \frac{c}{d} = \frac{a}{b} + (-\frac{c}{d})$$

a) $\frac{5}{7} - \frac{2}{7} = \dots\dots\dots\dots$

b) $\frac{3}{8} - \frac{7}{8} = \dots\dots\dots$

c) $\left(-\frac{2}{7}\right) - \frac{3}{7} = \dots\dots\dots\dots$

d) $\frac{1}{6} - \frac{2}{3} = \dots\dots\dots$

e) $3 - \frac{2}{5} = \dots\dots\dots\dots$

f) $\left(\frac{2}{5}\right) - \left(\frac{-1}{4}\right) = \dots\dots\dots\dots$

Try by your self:

(1) Calculate the value of each of following in its simplest form :

a) $\frac{3}{7} - (\frac{-2}{5})$

= ……………………………………

b) $\frac{4}{5} - \frac{3}{4}$

= ……………………………………

c) $\frac{1}{4} + 2\frac{3}{8}$

= ……………………………………

d) $2\frac{3}{8} - \frac{1}{4}$

= ……………………………………

(2) If $X = \frac{5}{6}$, $Y = \frac{-1}{3}$ and $Z = \frac{1}{2}$, Find in the simplest form :

a) $X - Y$ = ……………………………………

b) $(X + Y) - Z$ = ……………………………………

(3) If $a = \frac{1}{2}$, $b = \frac{-3}{2}$ find the value of :

$(a - b)^4 = $ ……………………………………

(4) Complete :

1) The remainder of subtracting $\frac{1}{5}$ from $\frac{6}{5}$ equals ……………

2) The remainder of subtracting $\frac{1}{3}$ from $\frac{-4}{3}$ is ……………

3) The increase of $\frac{3}{7}$ than $\frac{2}{7}$ is ……………

4) The decrease of $\frac{3}{7}$ than $\frac{2}{7}$ is ……………

5) If $(A + \frac{1}{4})$ is additive inverse of the number $\frac{3}{4}$, then A = ……

6) If $X = 2$, $Y = 3$ and $Z = 4$ then $\frac{X}{Y} - \frac{Z}{X}$ = ……………

(5) Use the number line to find the result of the following :-

$-\dfrac{1}{3} + \dfrac{5}{3} = $

....

$\dfrac{3}{8} - \dfrac{7}{8} = $

....

(6) Use the addition properties to find:

a) $\dfrac{5}{8} + (\dfrac{-3}{4}) + \dfrac{3}{8} + \dfrac{3}{4}$

....

....

....

b) $\dfrac{2}{7} + \dfrac{3}{4} + \dfrac{5}{7}$

....

....

....

Multiplying and Dividing rational numbers

If $\frac{a}{b}$, $\frac{c}{d}$, are two rational numbers then $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$

Find :

1) $\frac{2}{5} \times \frac{3}{4} =$ ....

2) $(\frac{-2}{3}) \times (\frac{-2}{5}) =$ ....

3) $(\frac{-1}{5}) \times \frac{4}{7} =$ ....

4) $(-3) \times \frac{3}{4} =$ ....

5) $(\frac{-12}{3}) \times \frac{3}{4} =$ ....

*Properties of the multiplication operation :

1) $a \times b \in Q$ closure property

2) $a \times b = b \times a$ commutative property

3) $(a \times b) \times c = a \times (b \times c)$ associative property

   $(\frac{2}{5} \times \frac{1}{3}) \times \frac{1}{2} = \frac{2}{5} \times (\frac{1}{3} \times \frac{1}{2})$

4) The multiplicative identity in Q is 1

   $1 \times 3 = 3$

5) The multiplicative inverse property

   $\frac{2}{3} \times \frac{3}{2} = 1$ $3 \times \frac{1}{3} = 1$ $-\frac{2}{7} \times -\frac{7}{2} = 1$

[1] Complete :

1) The multiplicative Identity of the rational number is ....

2) The multiplicative inverse of the number $\frac{3}{7}$ is ....

3) The multiplicative inverse of $(\frac{-3}{5})^{zero}$ is ....

4) The multiplicative inverse 0.7 is ....

5) The rational number $\frac{a-1}{5}$ has a multiplicative inverse if $a \neq$............

6) The rational number which has no multiplicative inverse is ....

7) $\frac{2}{3} \times (\frac{-4}{5}) = \frac{-4}{5} \times$ ....

8) $\frac{4}{5} \times$ .... $= \frac{4}{5}$

9) $2\frac{3}{5} \times$ .... $= 1$

10) $\frac{-4}{5} \times$ .... $= 0$

11) If $\frac{a}{b} = 80$, then $\frac{a}{2b}$ $=$ ....

12) If $\frac{X}{Y} = \frac{2}{3}$, then $\frac{3X}{2Y}$ $=$ ....

13) If $\frac{X}{Y} = \frac{2}{3}$, then $3x =$ ....

14)) If $\frac{X}{Y} = \frac{2}{3}$, then $3x - 2Y =$ .....

[2] Use the properties of multiplication operation to find each
   of the following :

1) $\frac{5}{12} \times \frac{2}{3} \times \left(\frac{-3}{5}\right)$

= ....

= ....

2) $\left(\frac{-5}{7}\right) \times \frac{2}{3} \times \left(\frac{-3}{5}\right)$

= ....

= ....

3) $\frac{5}{12} \times 3 + \frac{5}{12} \times 9$

= ....

= ....

4) $\frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$

= ....

= ....

5) $\frac{-3}{7} \times 8 + 5 \times \left(\frac{-3}{7}\right) + \left(\frac{-3}{7}\right)$

= ....

= ....

6) $\frac{5}{12} \times 3 + \frac{5}{12} \times 9 - \frac{5}{12}$

= ....

= ....

[3] Find the value of (n) in each of following :-

a) $\frac{-7}{3} \times \left(\frac{-3}{7}\right) = n$

b) $\frac{-5}{3} \times n = 0$

c) $\frac{3}{7} \times n = \frac{3}{7} \times \left(\frac{-4}{5}\right)$

d) $n \times \frac{19}{3} = 1$

e) $\frac{5}{9} \times n = \frac{5}{9}$

f) $n \times \left[\frac{1}{2} + \left(\frac{-3}{5}\right)\right] = n \times \frac{1}{2} + 5 \times \left(\frac{-3}{5}\right)$

[4] If $X = \dfrac{3}{2}$, $Y = \dfrac{-1}{4}$ and $Z = -2$, then find each of the following :

a) $\dfrac{1}{XYZ}$

= ....

b) $\dfrac{X}{Y} - \dfrac{Z}{Y}$

= ....

c) $(X + Z) \div (Y - Z)$

= .. ..

V.I.N

✓ Multiplying a rational number by 1 does not change its value.
✓ Multiplying a rational number by zero, the product equals zero.
✓ 1 is the multiplicative identity element in Q.
✓ There does not exist a multiplicative inverse for the number zero as $\frac{1}{0}$ is meaningless.

Try by yourself

*Complete each of the following:

[1] The multiplicative inverse of the number $\frac{-9}{8}$ is ....

[2] If $\frac{a}{b} = \frac{2}{3}$, then $\frac{3a}{2b} = $ ....

[3] The remainder of subtracting $\left(\frac{1}{5}\right)$ from $\left(-\frac{2}{5}\right)$ equals ....

[4] The simplest from of the expression : $\frac{3}{4} \times \left(\frac{1}{2} - \frac{1}{3}\right)$ is ....

[5] The rational number half way between $-\frac{5}{2}$ and $-\frac{3}{2}$ is ....

*Choose the correct answer:

[1] If $\frac{15}{\chi} = \frac{-3}{4}$, then $\chi = $ ....

   (a) – 20   (b) – 5   (c) 5   (d) 20

[2] The number $= \frac{-9}{-7}$ is the additive inverse of the number : ....

   (a) $\frac{-9}{7}$ (b) $\frac{-7}{9}$ (c) $\frac{7}{9}$ (d) $\frac{9}{7}$

[3] If $5\chi - 3y = 0$, then $\chi : y = $ ....

   (a) 5 : 3   (b) 3 : 5   (c) – 5 : 3   (d) – 3 : 5

[4] If $a \times \frac{b}{3} = \frac{a}{3}$, then b equals : ....

   (a) – a   (b) 1   (c) $\frac{a}{3}$ (d) a

[5] The number $\frac{5}{3} > $ ....

   (a) $\frac{10}{3}$ (b) $\frac{25}{9}$ (c) $\frac{10}{6}$ (d) $\frac{3}{5}$

*Use the property of distribution to calculate the value of :

$$\frac{6}{37} \times 7 + \frac{6}{37} \times 5 + \frac{6}{37} \times (-11)$$

....

....

* <u>Find a rational number at the middle of the way between :-</u>

a) $\frac{3}{8}$, $\frac{5}{8}$

....

....

b) $-\frac{1}{2}$, $-\frac{3}{4}$

....

....

2- <u>Find a rational number lying at :</u>

a) One third of the way between $\frac{4}{7}$, $1\frac{3}{4}$

....

....

b) One fifth of the way between $-\frac{2}{3}$, $-\frac{3}{5}$

....

....

Unit Two

[1] Algebraic Terms and Algebraic Expressions.

[1] Complete the following table:

Algebraic term	-7	$2ab^2$	3	$7ab^3c$	$-8x^2b$	Xy^2
Coefficient	-7	2				
Degree	0 Zero degree	$1+2=3$ Third degree				

[2] Complete :

1) The degree of term $3X^2Y$ is ..   .. . and its coefficient is ... .
2) The coefficient of the algebraic term $\frac{2}{3}X^4YZ^3$ is   .. and its degree is
   ....
3) The degree of the absolute term in algebraic expression is ....
4) The coefficient of the algebraic term $(-2)^3$ is   . . ..   and its degree is
   ....
5) $5X^2 + 3$ is an algebraic expression of the .... degree ....
6) The number of terms of the algebraic expression : $5Y^2 - 3XY + 2X^2$ is ....
   and its degree is ....
7) The coefficient of the algebraic term X is .... and its degree is
   ....
8) If the degree of the algebraic term $5X^nY^2$ is 5 , then $n =$ ....

[3] Arrange the terms of the algebraic expression : $7ab + 5a^5b^3 - 3a^2b^5$
according to the descending order of the indices of a

....

....
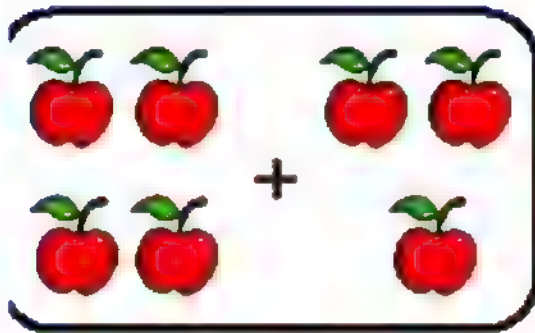
4a + 3a = 7a
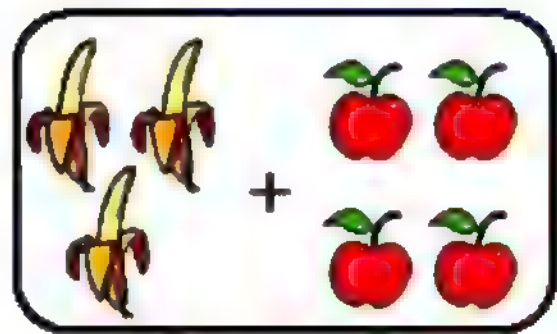
3b + 4a

The terms **3a** and **4a** are like terms.   The terms **3b** and **4a** are unlike terms.

The like terms

Terms whose variables and their exponents are the same.

Example: **7x** and **2x** are **like terms** because the variables are both "x"

But **7x** and **7x²** are NOT like terms (they are **Unlike Terms**)

[1] Put circles around the like terms in each of the following:

1) $3X$, $3a^2$, $2X$

2) $5X^2$, 7 , $5a$, 2

3) $-2XY$, $3Y$, $5X^2y$, $3XY^2$, X^2Y

* Simplify: 9a - 4b - 2c - 5a + 7b + 3c

Solution:

The expression = (9a − 5a) + (−4b + 7b) + (−2c + 3c)

$\qquad\qquad\quad$ = (9 − 5) a + (−4 + 7) b + (−2 + 3) c

$\qquad\qquad\quad$ = 4a $\qquad$ + $\qquad$ 3b $\qquad$ + c

[2] Complete:

1) $3X + 2X =$ ....

2) $-5a^2 + 3a^2 =$ ....

3) The result of subtracting $3a$ from $7a$ is ....

4) The result of subtracting $-3X^2$ from $5X^2$ is ....

[3] Reduce to the simplest form:

1) $3a + 2b + 5a + 4b$

$=$ ....

....

....

2) $3x - 5y - x + 2y =$

$=$ ....

....

....

3) $2X - 4y - 9X - 3y$

$=$ ....

....

....

4) $19m - 4n + 11m - 17n + 9n =$

$=$ ....

....

....

[4] Simplify each of the following algebraic expressions:

(1) $5X - 3X^2 + 4 - 7X^2 - 6X - 1$

$=$ ....

....

....

(2) $6X^2y - 3Xy^2 + 2Xy^2 - 5X^2y + 2X^2y^2$

$=$ ....

....

....

(3) $a^2 + 4a - 5 + 3a^2 - 6a + 1$

$=$ ....

....

....

(4) $5X^2 - 2X + 8 - 7X - 3 + X^2$

$=$ ....

....

....

[3] Adding and Subtracting Algebraic Expressions.

[1] Find the sum of each of following :-

a)
$$3a - 4b + 6c$$
$$5a + 6b - 2c$$
—————————
....

b)
$$3a - 7b - 5c + 2$$
$$-a + 4b + c - 5$$
—————————
....

c)
$$5x + 2y - z + 2$$
$$7x + y - 3z + 3$$
$$-2x - 5y + 4z - 1$$
—————————
....

d)
$$-2a^3 + 3a^2b \qquad - b^3$$
$$-5a^2b + 3ab^2 - 2b^3$$
$$5a^3 \qquad -4ab^2 + 3b^3$$
—————————
....

[2] Find the sum of each of following :-

1) $3X - 2Y + 5$, $X + 2Y - 2$

....

....

....

2) $2a^2b - 3ab^2 + b^3$, $-a^2b + b^3$

....

....

....

[3] Subtract:

1) $X - 2$ from $2X - 5$

....

....

....

2) $2X + 6y - 7$ from $2X + 2 - 5y$

....

....

....

3) $3X^2 - 5X$ from $1 - 5X + 6X^2$

....

....

....

[4] What is the increase of :

1) $5a + 7b$ than $3a - 2b$

....

....

2) $X^2 - 5X - 1$ than $3X^2 + 2X - 3$

....

....

[5] What is the decrease of :

$2a + 3b$ than $5b - 3a$

....

....

Try by yourself

[1] Simplify:

[a] $3x - 5y - x + 2y$

[c] $2x - 4y - 9x - 3y$

....

....

[b] $7a + 6b - 11a + 9b$

[d] $19m - 4n + 11m - 17n + 9n$

....

....

[2] Add $2x - 5z + y$ and $7x + 4y - 2z$

....

....

[3] Subtract $-a^2 - 5ab + 4b^2$ from $3a^2 - 2ab - 2b^2$

....

....

[4] Find the sum of each of the following:

[a]
$$3x - 4y + 2$$
$$\underline{-3x + 7y + 3}$$

[b]
$$3a - 7b - 5c + 2$$
$$-a + 4b + c - 5$$
$$\underline{2a \quad\quad + 3c + 3}$$

[c]
$$5x + 2y - z + 2$$
$$7x + y - 3z + 3$$
$$\underline{-2x - 5y + 4z - 1}$$

[5] [a] What is the increase of $x^2 - 5x - 1$ **than** $3x^2 + 2x - 3$

....

[b] What is the decrease of $2x - 8y - z$ **than the sum of** $3x - 3y + z, 2x - 4y - 8z$

....

....

[4] Multiplying and Diving Algebraic Terms.

1- Carry out the following operations :

1) $5 X \times 3 Y = \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$

2) $- 8 y^5 \times (- 7 y^4) = \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$

3) $5 X^3 y^4 \times 2 X y^2 = \dots\dots\dots\dots\dots\dots\dots\dots\dots$

4) $5 a b^2 \times (- 2 a^2 b) = \dots\dots\dots\dots\dots\dots\dots\dots\dots$

2- Find the quotient of each of following :

1) $- 32 a^3 b^6 \div (- 4 a^3 b^2) = \dots\dots\dots\dots\dots\dots\dots\dots$

2) $8 m^4 n^3 \div (- 4 m n^2) = \dots\dots\dots\dots\dots\dots\dots\dots\dots$

3) $- 18 X^3 Y^6 Z^3 \div (- 6 X^3 Y^3 Z^3) = \dots\dots\dots\dots\dots\dots$

4) $9 X^5 Y^4 \div 6 X^3 Y = \dots\dots\dots\dots\dots\dots\dots\dots\dots$

3- Simplify :-

1) $\dfrac{2}{3} t^4 \times \dfrac{3}{2} t^4$

2) $\dfrac{15 a^3 b}{2} \times \dfrac{8 a b^2}{10}$

$\dots\dots\dots\dots\dots\dots\dots\dots\dots$

$\dots\dots\dots\dots\dots\dots\dots\dots\dots$

3) $\dfrac{4 h^3 K^3}{7} \times \dfrac{21 h k^3}{2}$

4) $(3 X^3) \times (\dfrac{1}{6} X^2)$

$\dots\dots\dots\dots\dots\dots\dots\dots\dots$

$\dots\dots\dots\dots\dots\dots\dots\dots\dots$

2- Complete :

1) $36 a^5 b^8 = 12 a^3 b^2 \times \dots\dots\dots$

2) $9 a^5 = 3 a \times \dots\dots$

3) $- 4 c^3 d^3 = 2 c d^2 \times \dots\dots\dots$

4) $98 a^7 b^4 = \dots\dots \times 14 a^7 b$

[5] Multiplying a Monomial by on Algebraic Expression.

1- Simplify:

1) $5X(2X + Y - 3Z) = $ ....

2) $\frac{1}{3}X^2(6X^2 - 9XY - 3Y^2) = $ ....

3) $lm^2(l^2 - 3ml - 4m^2) = $ ....

2- Complete:

1) $X(\,.................. - 2X\,) = 6X - \,.................$

2) $3X(\,.................. + 5Y\,) = 6X^2 + \,...........$

3) $2X(3X\,.........\,) = \,.............. - 10X$

4) $3XY(\,.................. - \,.................. - 5X^2) = 6X^2Y - 12XY^2\,.........$

5) $9XY^2(\,............... - \,............... - 5X^2) = 36X^2Y^5 - 18XY^2 - \,.........$

3- Put in the simplest form:

1) $3a(a - b) + 4a(2a + b)$

$= $ ....

$= $ ....

2) $3a(4a - 2) - 4a(3a - 2)$

$= $ ....

$= $ ....

4- Simplify: $3(1 - 2X) - (X^2 - 5X + 3) + 2X(X + 3)$

then find numerical value if $X = -2$

....

....

....

[6] Multiplying a Binomial by an Algebraic Expression.

1- Write the missing term in each of the following products :

1) $(X+5)(X+3)=$ .... $+8X+$ ....

2) $(X+2)(X-4)=$ .... $-$ .... -8

3) $(a-3)(a-7)=a^2-$ .... $+$ ....

2- Find the product of each of the following :

1) $(X+3)(X-5)=$ ....

2) $(2X-Y)(3X+4Y)=$ ....

3- Simplify each each of the following to the simplest form:

1) $(a+3)^2$ 2) $(4m-7)^2$

....

....

3) $(2X+3Y)^2$ 4) $(X-3Y)^2$

....

....

4- Find by direct product the result :

1) $(a+2)(a-2)$ 2) $(4m-7)(4m+7)$

....

....

3) $(6X-2Y)(6X+2Y)$ 4) $(X+2Y)(X-2Y)(X^2+4Y^2)$

....

....

5- Choose the correct answer :

1) The middle term in the expansion of $(3X - 1)^2$ is ....

   a) $3X$ b) $- 6X$ c) $6X$ d) $6X^2$

2) The middle term in the expansion of $(2a + 3b)^2$ is ....

   a) $12ab$ b) $- 12ab$ c) $6ab$ d) $-6ab$

3) $X - Y = 3$ and $X + Y = 5$ then $X^2 - Y^2 = $ ....

   a) 2 b) $- 2$ c) 8 d) 15

4) If $X + Y = 7$ then the numerical value of the expression $X^2 + 2XY + Y^2 = $ ....

   a) 7 b) 14 c) 49 d) 28

5) If $(X - 3)(X + 3) = X^2 + k$, then $K = $ ....

   a) 9 b) 6 c) -9 d) -6

6- Complete the following :

1) $(2X - 1)^2 = $ .... $- 4X + 1$

2) $(X - 5)($ .... $) = X^2 - 25$

3) $(X + 5)(X + $ .... $) = X^2 + $ .... $+ 15$

7- Simplify :

1) $(X - 3)^2 - 9$

   ....

   ....

2) $3(m - 5)(m + 2)$

   ....

[7] Dividing an Algebraic Expression by a monomial.

1- Find the quotient in each of following :

1) $5a - 10$ by 5

= ....

....

2) $12a^2b + 20ab^2$ by $4ab$

= ....

....

3) $3a^2b - 6ab^2 + 12ab$ by $-3ab$

= ....

....

4) $32X^5 - 48X^3 + 72X^7$ by $-8X^3$

= ....

....

5) $\dfrac{12X^2 - 9X}{3X}$

= ....

....

6) $\dfrac{18X^4Y^2 - 42X^5Y^4 + 30X^6Y^5}{-6X^2Y^2}$

= ....

....
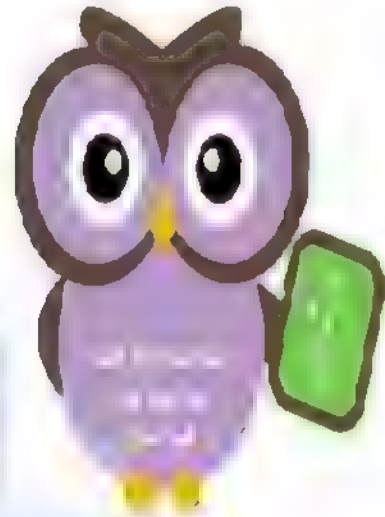
[1] Find the quotient in each case:

[a] $\dfrac{18a^2}{3a}$

[d] $\dfrac{18x^4 y^5 - 42x^5 y^4}{-6x^2 y^2}$

[b] $\dfrac{18m^4 + 32m^2}{-2m^2}$

[e] $\dfrac{24x^4 - 18x^3 - 42x^2}{6x^2}$

[c] $\dfrac{48x^3 - 80x^2}{8x^2}$

[f] $\dfrac{32x^9 - 48x^3 + 72x^7}{-8x^3}$

[8] Dividing an Algebraic Expression by another one.

1- Find the quotient of dividing of each of the following expressions.

1) $X^2 + 5X + 6$ by $(X + 2)$

....

....

....

....

2) $2X^2 + 13X + 15$ by $(X + 5)$

....

....

....

....

3) $3X^2 + X^3 - X - 3$ by $(X^2 - 1)$

....

....

....

....

4) $X^4 + 3X^2 + 2$ by $(X^2 + 1)$

....

....

....

....

[9] Factorization by identifying the H.C.F.

1- Factorize each of following by H.C. F. :

1) $5a + 5b$

....

2) $5Y - 10$

....

3) $35a + 10a^2$

....

4) $15a^3b - 5a^2b^2$

....

5) $49b^2 - 7b^3$

....

6) $6a^3 - 4a^2b^2$

....

7) $18a^2bc - 6abc + 30abc^2 - 24ab^2c^2$

....

2- Complete the following:

1) $6a^2 + 12ab = 3a(\ .... + ...)$

2) $a^2b + b^2a = ... (a + b)$

3) $X(a + 1) - y(a + 1) = (a + 1)(\ .... - ....)$

3- Find the result by the H.C. F :

1) $7 \times 123 + 7 \times 35 - 7 \times 18$

....

....

2) $6 \times (15)^2 + 18 \times 15 - 8 \times 15$

....

....

3) $5 \times (48)^2 + 7 \times 48 + 53 \times 48$

....

Unit Three statistics.

1- Complete :
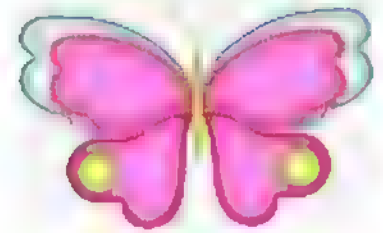
1) The mode of a set of values is …………

2) The mode of the values 2 , 3 , 8 , 2 , 9 is … …… .

3) The mode of the values 3 , 6 , 10 , 13 , 19 , 19 , 21 is ……… ..

4) If the mode of the values $\frac{1}{3}$, $\frac{1}{7}$, $\frac{1}{5}$, $\frac{1}{7}$ is $\frac{1}{X}$ then X = ………

5) If the mode of the values 12 , 7 , X + 1 , 7 , 12 is 7 then X is …………

6) If the mode of the values of a + 2 , a + 1 , a + 3 , a + 2 equal 12 then a = ……….

8) The median of : 6 , 5 , 9 , 8 is ……………..

9) The median of : 8 , 17 , 4 , 6 , 10 is ……… …

10) The order of the median of 6 , 2 , 5 , 4 , 1 is ……………..

11) The mean of the values 5 , 12 , 6 , 17 is ……… …

12) The mean of the numbers 2 , 5 , 8 , 9 , 14 , 28 is .. ……..

13) The mean of the value 2 − a , 4 , 1 , 5 , 3 + a is ……………

15) If mean of the numbers 9 , 4 , 5 , X is 5 then X is ……………

16) If the mean of : X − 1 , X , X + 1 is 6 then X = ……………

Set of Rational Numbers

Remember:-

1. Counting Numbers = $\{1, 2, 3, 4, \ldots\}$

2. Set of Integers $Z = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$

3. Set of Natural Number = $\{0, 1, 2, 3, \ldots\}$

4. $Z^+ = \{1, 2, 3, \ldots\}$

5. $Z^- = \{-1, -2, -3, \ldots\}$

6. $N \subset Z$

7. $Z = Z^+ \cup \{0\} \cup Z^-$

8. If $|x| = a$ then $x = \pm a$

Ex 1:- Complete

1. $Z - N = \ldots$ 2. $Z^+ \cup \{0\} = \ldots$

3. $Z^+ \cap Z^- = \ldots$ 4. $N \cap Z = $

5. $|-3| = \ldots$ 6. $|0| = \ldots$

7. If $|x| = 7$ then $x = \ldots$ or $x = \ldots$

8. If $|x| = 0$ then $x = \ldots$

Ex 2: find the value of x when

1. $x + 2 = |-3|$ 2. $|x| + 2 = 5$
3. $|x| - 5 = 2 + |-2|$ 4. $2x + 5 = 7$

Definition of the rational number:-

It's a number that can be expressed in the form $\frac{a}{b}$ where a and b are integers and $b \neq 0$

i.e.

$$Q = \left\{ x: x = \frac{a}{b}, a \in \mathbb{Z}, b \in \mathbb{Z}, b \neq 0 \right\}$$

Ex:- put $\in$ or $\notin$

		the answer	Because
① $\frac{2}{3}$ ...	Q	$\in$	$\frac{2}{3}$ in the form $\frac{a}{b}, b \neq 0$
② 0.2 ...	Q	$\in$	$0.2 = \frac{2}{10}$ in the form $\frac{a}{b}, b \neq 0$
③ 25% ...	Q	$\in$	$25\% = \frac{25}{100}$ in the form $\frac{a}{b}$
④ $1\frac{1}{4}$ ...	Q	$\in$	$1\frac{1}{4} = \frac{5}{4}$ in the form $\frac{a}{b}$
⑤ -2 ...	Q	$\in$	$-2 = \frac{-2}{1}$
⑥ zero ...	Q	$\in$	zero $= \frac{0}{1}$
⑦ 3 ...	Q	$\in$	$3 = \frac{3}{1}$
⑧ $\frac{1}{0}$ ...	Q	$\notin$	be cause the denominator $= 0$
⑨ $\frac{2}{5-5}$ ...	Q	$\notin$	be cause the denominator $= 0$

Notes

① $\frac{a}{b} \in Q$ if $b \neq 0$ (denominator = zero)

② $\frac{a}{b} = 0$ if $a = $ zero , $b \neq$ zero

③ $\frac{a}{b}$ is an integer if the numerator is divisible by the denominator.

(4) $\frac{a}{b} > 0$ (positive) if $ab > 0$

(if a,b have the same sign)

(5) $\frac{a}{b} < 0$ (negative) if $ab < 0$

Ex:- If x is an integer, write the required condition to make each of the following a rational number:

① $\frac{2}{x-5}$ $\Rightarrow$ the condition $x-5 \neq 0$ i.e $x \neq 5$

② $\frac{5}{x+3}$ $\Rightarrow$ the condition $x+3 \neq 0$ i.e $x \neq -3$

③ $\frac{7}{2x-4}$ $\Rightarrow$ the condition $2x-4 \neq 0 \Rightarrow 2x \neq 4$ $\div 2$ i.e. $x \neq 2$

④ $\frac{5}{2x}$ $\Rightarrow$ the condition $2x \neq 0$ $\div 2$ i.e $x \neq 0$

⑤ $\frac{3}{|x|-4}$ $\Rightarrow$ the condition $|x|-4 \neq 0$ $\Rightarrow |x| \neq 4$ i.e. $x \neq \pm 4$

⑥ $\frac{2}{3x+6}$ $\Rightarrow$ the condition $3x+6 \neq 0$

therefore $\Rightarrow 3x \neq -6$ $\div 3$

i.e. $x \neq -2$

(4)

Ex:- If x is an integer, write the required condition to mak each of the following = Zero

[1] $\dfrac{x-3}{4}$ since $\dfrac{x-3}{4} = 0$ therefore $x-3=0$
$$i.e \quad x=3$$

(2) $\dfrac{2-x}{3}$

Since $\dfrac{2-x}{3} = 0$ there fore $2-x=0$ i.e $x=2$

(3) $\dfrac{x+3}{x+4}$

Since $\dfrac{x+3}{x+4} = 0$ therefore $x+3=0$ i.e. $x=-3$

(4) $\dfrac{3x-3}{x}$

Since $\dfrac{3x-3}{x} = 0$ therefore $3x-3=0$
$$\Rightarrow 3x=3 \div 3 \quad i.e \; x=1$$

(5) $\dfrac{2x}{x+3}$

Since $\dfrac{2x}{x+3} = 0$ therefore $2x=0 \div 2 \Rightarrow x=0$

(6) $\dfrac{3x+6}{x+1}$

Since $\dfrac{3x+6}{x+1} = 0$ there fore
$$3x+6=0$$
$$3x = -6 \div 3$$
$$\boxed{x = -2}$$

Different forms of a rational number

1) Writing the rational number in its simplest form:

Ex: put each of the following numbers in its simplest form:

① $\dfrac{10}{15} = \dfrac{2}{3}$ ($\div 5$) Dividing the two terms by 5

② $\dfrac{45}{20} = \dfrac{9}{4}$ ($\div 5$)

③ $\left| -\dfrac{18}{12} \right| = \dfrac{18}{12} = \dfrac{3}{2}$ Dividing the two terms by 6

④ $\left| 20\% \right| = \dfrac{20}{100} = \dfrac{1}{5}$ Dividing the two terms by 20

⑤ $-\dfrac{24}{28} = -\dfrac{6}{7}$ Dividing the two terms by 4

* the form of a terminating decimal

To write the rational number in the form of a terminating decimal we mak its denominator equal to 10, 100, 1000, ...

Ex: write each of the following numbers in the form of a terminating decimal:

① $\dfrac{2}{5}$ (To mak denominator 10 multiplying the two terms by 2

$\dfrac{2}{5} = \dfrac{4}{10} = 0.4$

(6)

(2) $\dfrac{-3}{8}$

To make denominator 1000 multiplying the two terms by (125)

$$\dfrac{-3}{8} = \dfrac{-3 \times 125}{8 \times 125} = \dfrac{375}{1000} = -0.375$$

(3) $\dfrac{3}{4}$

To make denominator 100 multiplying the two Terms by 25

$$\dfrac{3}{4} = \dfrac{3 \times 25}{4 \times 25} = \dfrac{75}{100} = 0.75$$

(4) $\dfrac{7}{25}$

To make denominator 100 multiplying the two terms by 4

$$\dfrac{7}{25} = \dfrac{7 \times 4}{25 \times 4} = \dfrac{28}{100} = 0.28$$

(5) $-2\dfrac{2}{25} = -2\dfrac{2 \times 4}{25 \times 4} = -2\dfrac{8}{100} = -2.08$

(6) $\dfrac{7}{5} = \dfrac{7 \times 2}{5 \times 2} = \dfrac{14}{10} = 1.4$

(7) $|-2\frac{1}{5}| = 2\frac{1}{5} = 2\dfrac{1 \times 2}{5 \times 2} = 2\dfrac{2}{10} = 2.2$

(8) $-5\dfrac{3}{5} = -5\dfrac{3 \times 2}{5 \times 2} = -5\dfrac{6}{10} = -5.6$

* The form of per centage :

To write the rational number in the form of percentage we make its denominator $= 100$.

Ex: Write each of the following numbers in the form of percentage

(1) $\dfrac{3}{5} = \dfrac{3}{5} \times \overset{20}{100} \% = 60 \%$

(2) $\dfrac{7}{5} = \dfrac{7}{5} \times \overset{20}{100} \% = 140 \%$

(3) $\dfrac{1}{2} = \dfrac{1}{2} \times \overset{50}{100} \% = 50 \%$

(4) $\dfrac{5}{4} = \dfrac{5}{4} \times \overset{25}{100} \% = 125 \%$

(5) $\left|-\dfrac{6}{25}\right| = \dfrac{6}{25} \times \overset{4}{100} \% = 24 \%$

(6) $3.2 = 3.2 \times 100 \% = 320 \%$

(7) $0.15 = 0.15 \times 100 \% = 15 \%$

(8) $\dfrac{9}{20} = \dfrac{9}{20} \times \overset{5}{100} \% = 45 \%$

The recurring decimal

Ex: Write each of the following in the form $\dfrac{a}{b}$

(1) $0.\dot{5} = \dfrac{5}{9}$

(2) $-0.\dot{7} = -\dfrac{7}{9}$

(3) $0.\dot{4}\dot{5} = \dfrac{45}{99} = \dfrac{5}{11}$

(4) $-0.\dot{1}\dot{2} = -\dfrac{12}{99} = -\dfrac{4}{33}$

(5) $0.\dot{4}0\dot{7} = \dfrac{407}{999}$

(6) $9.\dot{3} = 9\dfrac{3}{9} = 9\dfrac{1}{3}$

Ex:– Write each of the following in the form $\frac{a}{b}$

(1) $0.4 = \frac{4}{10} = \frac{2}{5}$

(2) $0 = \frac{0}{1}$

(3) $-0.01 = -\frac{1}{100}$

(4) $0.75 = \frac{75}{100} = \frac{3}{4}$

(5) $3\frac{3}{4} = \frac{15}{4}$

(6) $8\frac{2}{3} = \frac{26}{3}$

(7) $0.001 = \frac{1}{1000}$

(8) $-7 = -\frac{7}{1}$

(9) $1.25 = \frac{125}{100} = \frac{25}{20} = \frac{5}{4}$

(10) $30\% = \frac{30}{100} = \frac{3}{10}$

(11) $45\% = \frac{45}{100} = \frac{9}{20}$

(12) $0.\dot{5} = \frac{5}{9}$

(13) $0.\dot{1}\dot{5} = \frac{15}{99} = \frac{5}{33}$

(14) $-1.\dot{1}\dot{8} = -1\frac{18}{99} = -1\frac{2}{11} = \frac{-13}{11}$

(15) $0.0\dot{4}\dot{5} = \frac{45}{990} = \frac{5}{110} = \frac{1}{22}$

(16) $0.\dot{2}8\dot{5} = \frac{285}{999} = \frac{95}{333}$

Try by yourself

① Write the required condition to make each of the following a rational number:

1. $\dfrac{5}{a-3}$ 2. $\dfrac{3}{4-x}$ 3. $\dfrac{7}{8b}$ 4. $\dfrac{2}{|x|-1}$

5. $\dfrac{5}{x}$ 6. $\dfrac{6}{x-9}$ 7. $\dfrac{2}{5x-10}$ 8. $\dfrac{4}{2x+8}$

9. $\dfrac{1}{5-x}$ 10. $\dfrac{2}{3a+3}$ 11. $\dfrac{16}{4-|x|}$ 12. $\dfrac{8x}{3|x|-9}$

② Write the required condition to make each of the following $= 0$

1. $\dfrac{a-3}{a+1}$ 2. $\dfrac{b+2}{b-2}$ 3. $\dfrac{4-x}{x}$ 4. $\dfrac{5+y}{y+7}$

5. $\dfrac{2y-4}{y-1}$ 6. $\dfrac{6-3x}{x+4}$ 7. $\dfrac{x}{x+5}$ 8. $\dfrac{2x}{x-3}$

③ put each of the following numbers in the form of a terminating decimal:

1. $\dfrac{1}{2}$ 2. $\dfrac{3}{5}$ 3. $\dfrac{-7}{20}$ 4. $2\dfrac{3}{25}$ 5. $\dfrac{3}{2}$ 6. $\dfrac{7}{2}$

7. $\dfrac{12}{5}$ 8. $\dfrac{-6}{25}$ 9. $\dfrac{-7}{50}$ 10. $\dfrac{5}{8}$ 11. $-2\dfrac{3}{5}$

④ write each of the following numbers in the form of percentage:

1. $\dfrac{4}{5}$ 2. $\dfrac{6}{8}$ 3. $2\dfrac{1}{2}$ 4. $\dfrac{8}{25}$ 5. $\dfrac{1}{4}$ 6. $1-\dfrac{1}{5}$

7. $|-0.4|$ 8. $\dfrac{6}{4}$ 9. $\left|\dfrac{-13}{2}\right|$ 10. $0.\dot{3}$

Comparing and ordering Rational Numbers.

Ex.1 Represent the rational number $\frac{3}{4}$ on the number line

Solution:-
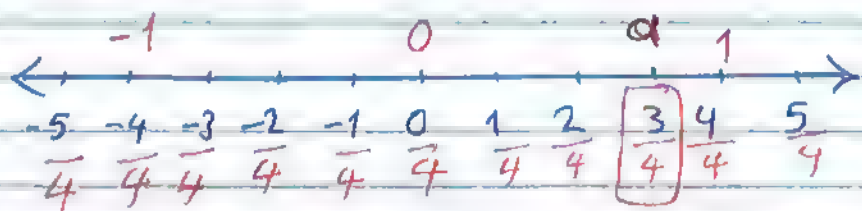
Ex.2: Represent the rational numbers $2, 0, \frac{3}{2}, \frac{-5}{2}, -3$

on the number line then arrange them descendingly

Solution:

We Should Convert their denominators to have common denominator at first

Since L.C.M of the denominators is 2
Then the numbers after Converting their denominator are

$$\frac{4}{2} , \frac{0}{2} , \frac{3}{2} , \frac{-5}{2} , \frac{-6}{2}$$

then : $\frac{4}{2} > \frac{3}{2} > \frac{0}{2} > \frac{-5}{2} > \frac{-6}{2}$

i.e $2 > \frac{3}{2} > 0 > \frac{-5}{2} > -3$

Ex3 Compare between the two rational numbers

$$\frac{2}{3} \quad \text{and} \quad \frac{3}{4}$$

Solution

We should convert their denominators to have common denominator at first

$$\frac{2}{3} \quad \frac{3}{4} \Rightarrow \frac{8}{12} \quad \frac{9}{12}$$

Since $\frac{8}{12} < \frac{9}{12}$ then $\frac{2}{3} < \frac{3}{4}$

Ex4: find four rational numbers lying between

the two numbers ① $\frac{1}{2}$ and $\frac{1}{3}$

Solution   ②) $\frac{-3}{5}$ and $-\frac{2}{3}$

① $\frac{1}{2} \quad \frac{1}{3} \Rightarrow \frac{3}{6}$ and $\frac{2}{6}$

$$\Rightarrow \frac{30}{60} \text{ and } \frac{20}{60}$$

$$\Rightarrow \frac{20}{60} < \frac{21}{60} < \frac{22}{60} < \frac{23}{60} < \frac{24}{60} < \frac{30}{60}$$

② $\frac{-3}{5} \quad \frac{-2}{3} \Rightarrow -\frac{9}{15} \quad -\frac{10}{15}$

$$\Rightarrow \frac{-90}{150} \quad -\frac{100}{150}$$

then the numbers are: $\frac{-91}{100} , \frac{-92}{100} , \frac{-93}{100} , \frac{-94}{100}$

EX:5 Complete each of the following using the suitable Sign (<, > or =):

(1) $\frac{7}{5}$ ... $\frac{4}{5}$ (2) $-\frac{3}{4}$ ... $-\frac{2}{4}$

(3) $\frac{1}{5}$ ... $\frac{1}{6}$ (4) $\frac{3}{6}$ ... $\frac{2}{3}$

(5) $\frac{4}{10}$ ... $\frac{14}{35}$ (6) $|-\frac{10}{15}|$ ... $\frac{2}{3}$

Try by yourself

(1) Represent on the number line each of the following rational numbers

① $\frac{1}{3}$ ② $\frac{-7}{4}$ ③ $-\frac{1}{3}$ ④ $1\frac{1}{5}$ ⑤ $-3\frac{1}{2}$

(2) Compare between

① $\frac{2}{3}$ and $\frac{5}{7}$ ② $\frac{1}{5}$ and $\frac{1}{6}$ ③ $-\frac{8}{15}$ and $-\frac{2}{3}$

④ 0.6 and $\frac{5}{6}$

(3) Find two rational numbers lying between

① $\frac{4}{5}$ and $\frac{3}{4}$ ② $\frac{4}{5}$ and $\frac{5}{6}$ ③ $\frac{4}{5}$ and 0.7 ④ $\frac{3}{4}, 2$

(4) Represent the rational numbers: $2, \frac{5}{2}, \frac{7}{2}, 0, -1$ on the number line then arrange the ascendingly

⑤ Complete each of the following using the suitable sign (<, > or =):

① $\frac{3}{4}$ ... $\frac{1}{5}$ ② $\frac{-3}{15}$ ... $\frac{-2}{5}$ ③ $\frac{3}{15}$ ... $\frac{4}{20}$

④ $\frac{-6}{9}$ ... $\frac{-2}{6}$ ⑤ $\frac{3}{2}$ ... $\frac{3}{5}$

⑥ Complete each of the following

① $\frac{3}{5}$ > ... > $\frac{2}{5}$ ② $-\frac{1}{3}$ > ... > $\frac{-2}{3}$

③ $\frac{1}{4}$ > ... > $\frac{1}{8}$ ④ $\frac{-3}{14}$ > ... > $\frac{-2}{7}$

⑤ $\frac{1}{4}$ > ... > $\frac{1}{6}$ ⑥ $\frac{-7}{9}$ > ... > $\frac{-5}{6}$

Adding and Subtracting Rational Numbers

(1) Adding two rational numbers having the same denominator:

If $\dfrac{a}{b}$ and $\dfrac{c}{b}$ are two rational numbers then:

$$\dfrac{a}{b} + \dfrac{c}{b} = \dfrac{a+c}{b}$$

(2) Adding two rational numbers with different denominators:

If $\dfrac{a}{b}$ and $\dfrac{c}{d}$ are two rational numbers then:

$$\dfrac{a}{b} + \dfrac{c}{d} = \dfrac{ad+bc}{bd}$$

Example ① Add:

(1) $\dfrac{1}{5} + \dfrac{2}{5} = \dfrac{1+2}{5} = \dfrac{3}{5}$

(2) $\dfrac{5}{6} + \left(-\dfrac{1}{6}\right) = \dfrac{5-1}{6} = \dfrac{4}{6} = \dfrac{2}{3}$ $(\div 2)$

(3) $\dfrac{7}{8} + \left(\dfrac{-5}{8}\right) = \dfrac{7-5}{8} = \dfrac{2}{8} = \dfrac{1}{4}$ $(\div 2)$

(4) $-\dfrac{1}{4} + \dfrac{3}{4} = \dfrac{-1+3}{4} = \dfrac{2}{4} = \dfrac{1}{2}$ $(\div 2)$

(5) $\dfrac{5}{9} + \left(-\dfrac{2}{9}\right) = \dfrac{5-2}{9} = \dfrac{3}{9} = \dfrac{1}{3}$ $(\div 3)$

(6) $-\dfrac{2}{3} + \left(-\dfrac{1}{3}\right) = \dfrac{-2-1}{3} = \dfrac{-3}{3} = -1$

(7) $\dfrac{2}{8} - \left(-\dfrac{3}{8}\right) = \dfrac{7+3}{8} = \dfrac{10}{8} = \dfrac{5}{4}$

(+)

(8) $\dfrac{3}{5} + \left(-\dfrac{1}{5}\right) = \dfrac{3-1}{5} = \dfrac{2}{5}$

(−)

(9) $\dfrac{1}{4} + \dfrac{3}{4} = \dfrac{1+3}{4} = \dfrac{4}{4} = 1$

(10) $\dfrac{1}{2} + \dfrac{1}{3} = \dfrac{1\times3 + 1\times2}{2\times3} = \dfrac{3+2}{6} = \dfrac{5}{6}$

(11) $\dfrac{2}{3} + \dfrac{1}{4} = \dfrac{2\times4 + 3\times1}{3\times4} = \dfrac{8+3}{12} = \dfrac{11}{12}$

(12) $\dfrac{1}{2} + \dfrac{2}{5} = \dfrac{1\times5 + 2\times2}{2\times5} = \dfrac{5+4}{10} = \dfrac{9}{10}$

(13) $\dfrac{3}{4} - \dfrac{1}{3} = \dfrac{3\times3 - 1\times4}{4\times3} = \dfrac{9-4}{12} = \dfrac{5}{12}$

(14) $\dfrac{-2}{3} - \dfrac{1}{2} = \dfrac{-2\times2 - 1\times3}{3\times2} = \dfrac{-4-3}{6} = \dfrac{-7}{6}$

(15) $\dfrac{-1}{5} + \dfrac{1}{3} = \dfrac{-1\times3 + 5\times1}{5\times3} = \dfrac{-3+5}{15} = \dfrac{2}{15}$

(16) $\dfrac{3}{4} - \dfrac{1}{2} = \dfrac{3\times2 - 1\times4}{4\times2} = \dfrac{6-4}{8} = \dfrac{2}{8} = \dfrac{1}{4}$

(17) $\dfrac{4}{9} - \dfrac{2}{3} = \dfrac{4\times3 - 2\times9}{9\times3} = \dfrac{12-18}{27} = \dfrac{-6}{27} = \dfrac{-2}{9}$

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(16)

properties of addition operation in Q

1) Closure property:

The sum of any two rational numbers is a rational number

If $\frac{a}{b}, \frac{c}{d} \in Q$ then

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + cb}{bd} \in Q$$

2) Commutative property:

If: $\frac{a}{b}$ and $\frac{c}{d}$ are two rational numbers, then:

$$\frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$$

3) Associative property:

If: $\frac{a}{b}, \frac{c}{d}$ and $\frac{e}{f}$ are three rational numbers, then:

$$\left(\frac{a}{b} + \frac{c}{d}\right) + \frac{e}{f} = \frac{a}{b} + \left(\frac{c}{d} + \frac{e}{f}\right) = \frac{a}{b} + \frac{c}{d} + \frac{e}{f}$$

4) The existence of identity element property

in addition:

Zero is the identity element in addition operation

in Q

$$\frac{a}{b} + Zero = Zero + \frac{a}{b} = \frac{a}{b}$$

(5) the existence of additive inverse property

For every rational number $\frac{a}{b}$ there exist an additive inverse to that is $-\frac{a}{b}$

where $\quad \frac{a}{b} + (-\frac{a}{b}) = zero$

$$-\frac{a}{b} + \frac{a}{b} = zero$$

* Zero is its own additive inverse.

Ex:- Complete

① The additive inverse of $\frac{2}{3}$ is ...

② The additive inverse of $-\frac{1}{2}$ is ...

③ the additive inverse of zero is ...

④ the additive inverse of -1 is ...

⑤ the additive inverse of $(-\frac{1}{2})^{zero} = $ ...

⑥ the additive inverse of $(\frac{3}{5})^{zero} = $ ...

⑦ the additive inverse of $|-\frac{3}{5}|$ is ...

Ex: Use the addition properties in $\mathbb{Q}$ to carry out the following.

① $\dfrac{2}{7} + \dfrac{3}{4} + \dfrac{5}{7} + \dfrac{1}{4}$

$= \left(\dfrac{2}{7} + \dfrac{5}{7}\right) + \left(\dfrac{3}{4} + \dfrac{1}{4}\right)$

Commutative and associative properties

$= \dfrac{7}{7} + \dfrac{4}{4}$

$= 1 + 1 = 2$ (the result in its simplest form)

② $\dfrac{2}{3} + \dfrac{5}{9} + \dfrac{-2}{3} + \dfrac{4}{9}$

$= \left[\dfrac{2}{3} + \left(-\dfrac{2}{3}\right)\right] + \dfrac{5}{9} + \dfrac{4}{9}$

Commutative and associative properties

$= 0 + \dfrac{9}{9}$ (the additive inverse)

$= \dfrac{9}{9}$ (the identity element)

$= 1$ (the result in its simplest form)

Ex: Write the addition property which used in each of the following

① $\frac{7}{2} + \frac{9}{16} = \frac{9}{16} + \frac{7}{2}$

② $Zero + \frac{3}{4} = \frac{3}{4}$

③ $(\frac{2}{3} + \frac{1}{3}) + \frac{1}{6} = \frac{2}{3} + (\frac{1}{3} + \frac{1}{6})$

④ $\frac{3}{4} + (\frac{-3}{4}) = Zero$

⑤ $\frac{5}{8} + Zero = \frac{5}{8}$

Second: Subtraction operation:

If $\frac{a}{b}$ and $\frac{c}{d}$ are two rational numbers, then:

$$\frac{a}{b} - \frac{c}{d} = \frac{a}{b} + (-\frac{c}{d})$$

i.e the Subtraction operation in Q is defined as adding the minued $(\frac{a}{b})$ to the additive inverse of the subtrahend $(\frac{c}{d})$

(20)

Ex: If $a = \dfrac{3}{4}$, $b = -\dfrac{5}{2}$ and $c = \dfrac{1}{2}$ find the numerical value of each of:

① $a - b$ ② $(a + b) - c$

Solution

① $a - b = \dfrac{3}{4} - \left(-\dfrac{5}{2}\right) = \dfrac{3}{4} + \dfrac{5}{2}$

$$= \dfrac{6 + 20}{8} = \dfrac{26}{8} = \dfrac{13}{4}$$

② $(a + b) - c$

$$= \left(\dfrac{3}{4} + \dfrac{-5}{2}\right) - \dfrac{1}{2}$$

$$= \left(\dfrac{6 - 20}{8}\right) - \dfrac{1}{2}$$

$$= \dfrac{-14}{8} - \dfrac{1}{2} = -\dfrac{7}{4} - \dfrac{1}{2} = \dfrac{-14 - 4}{8} = \dfrac{18}{8} = \dfrac{9}{4}$$

Multiplying and Dividing Rational Numbers

First: Multiplication operation

If $\frac{a}{b}$ and $\frac{c}{d}$ are two rational numbers

then: $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$

Remember:

$\oplus \times \oplus = \oplus$, $\ominus \times \ominus = \oplus$

$\oplus \times \ominus = \ominus$, $\ominus \times \oplus = \ominus$

Ex: Find the result of each of the following in its simplest form:

① $\frac{3}{6} \times \frac{2}{5} = \frac{3 \times 2}{6 \times 5} = \frac{6}{30} = \frac{1}{5}$

② $\frac{-3}{4} \times \frac{2}{9} = \frac{-3 \times 2}{4 \times 9} = \frac{-6}{36} = \frac{-1}{6}$

③ $\frac{1}{2} \times (-2) = \frac{1 \times -2}{2 \times 1} = \frac{-2}{2} = -1$

④ $\frac{-7}{8} \times \frac{4}{14} = \frac{-7 \times 4}{8 \times 14} = \frac{-1 \times 1}{2 \times 2} = \frac{-1}{4}$

⑤ $25\% \times (-\frac{3}{4}) = \frac{25}{100} \times (\frac{-3}{4}) = \frac{1}{4} \times \frac{-3}{4} = \frac{-3}{16}$

⑥ $-1\frac{1}{2} \times -0.\dot{3} = -\frac{3}{2} \times -\frac{1}{3} = \frac{-3 \times -1}{2 \times 3} = \frac{3}{6} = \frac{1}{2}$

properties of the set of rational numbers under multiplication:

for any three rational numbers as $\frac{a}{b}$, $\frac{c}{d}$ and $\frac{e}{f}$ the following properties are satisfied:

① closure property:

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d} \in \mathbb{Q}$$

the product of any two rational numbers is a rational number.

② Commutative property:

$$\frac{a}{b} \times \frac{c}{d} = \frac{c}{d} \times \frac{a}{b}$$

③ Associative property:

$$\left(\frac{a}{b} \times \frac{c}{d}\right) \times \frac{e}{f} = \frac{a}{b} \times \left(\frac{c}{d} \times \frac{e}{f}\right) = \frac{a}{b} \times \frac{c}{d} \times \frac{e}{f}$$

④ The existence of multiplicative indentity element property:

The number 1 "one" is the multiplicative identity in $\mathbb{Q}$

$$\frac{a}{b} \times 1 = 1 \times \frac{a}{b} = \frac{a}{b}$$

⑤ The existence of multiplicative inverse property in $\mathbb{Q}$ for every rational number $\frac{a}{b}$ except zero

there is a multiplicative invers $\Rightarrow \frac{b}{a}$

$$\frac{b}{a} \times \frac{a}{b} = 1$$

the multiplicative inverse property

<u>Ex:</u> Complete

① The multiplicative inverse of the number $\frac{3}{4}$ is ...

② The multiplicative inverse of the number -5 is ...

③ The multiplicative inverse of the number 0.5 is ...

④ the multiplicative inverse of the number $2\frac{1}{2}$ ...

⑤ the multiplicative inverse of the number $(-\frac{2}{3})^{zero}$ ...

⑥ the multiplicative inverse of the number -1 is ...

<u>Remarks</u>

① The multiplicative inverse of the rational number is called the reciprocal of the rational number

② Zero has no multiplicative inverse

$$\frac{1}{0}$$ is meaningless

③ multiplying any rational number by zero equals zero

235

6 The distributive property :

Ex: Use the distributing property to find the value of each of the following:

1) $\frac{13}{12} \times 7 + \frac{13}{12} \times 5$

$$= \frac{13}{12} \times (7+5) = \frac{13}{12} \times \frac{12}{1} = 13$$

2) $\frac{4}{9} \times 11 + \frac{4}{9} \times 16$

$$= \frac{4}{9} \times (11+16) = \frac{4}{9} \times \frac{\overset{3}{\cancel{27}}}{1} = 12$$

3) $\frac{5}{13} \times 2 + \frac{5}{13} \times 4 + \frac{5}{3} \times 7$

$$= \frac{5}{13} \times (2+4+7) = \frac{5}{13} \times 13 = 5$$

4) $\frac{4}{7} \times 4 + \frac{4}{7} \times 2 + \frac{4}{7} \times 1$

$$= \frac{4}{7} \times (4+2+1)$$

$$= \frac{4}{7} \times 7 = 4$$

5) $\frac{-3}{7} \times 8 + 5 \times (\frac{-3}{7}) + (\frac{-3}{7})$

$$= \frac{-3}{7} \times (8+5+1) = \frac{-3}{7} \times \overset{2}{\cancel{14}} = -6$$

Second: Division operation.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Ex: Find the result of each of the following in the Simplest form:

① $\frac{1}{2} \div \frac{3}{5} = \frac{1}{2} \times \frac{5}{3} = \frac{1 \times 5}{2 \times 3} = \frac{5}{6}$

② $\frac{-3}{5} \div \frac{9}{5} = \frac{-3}{5} \times \frac{5}{9} = \frac{-15}{45} = \frac{-1}{3}$

③ $\frac{-14}{15} \div \left(\frac{-21}{5}\right) = \frac{-14}{15} \times \frac{-5}{21} = \frac{-2}{3} \times \frac{-1}{3} = \frac{2}{9}$

④ $2\frac{1}{4} \div 1\frac{1}{2} = \frac{9}{4} \div \frac{3}{2} = \frac{9}{4} \times \frac{2}{3} = \frac{18}{12} = \frac{3}{2}$

Ex: find the value of x in each of the following

① $\frac{5}{7} \times x = \frac{5}{7}$

② $x \times \frac{17}{3} = 1$

③ $\frac{-7}{3} \times x = zero$

④ $\frac{-7}{3} \times \frac{-3}{7} = x$

⑤ $\frac{3}{5} \times x = \frac{-4}{5} \times \frac{3}{5}$

⑥ $\frac{3}{4} \div x = \frac{3}{4} \times \frac{-2}{5}$

Applications on the Rational Numbers

1) The number that lies at the midpoint of the way between any two numbers

$$= \frac{1}{2} \text{ Sum of them}$$

2) the number that lies at one third of the way between two numbers

$$= \text{The smallest number} + \frac{1}{3} \text{ the distance}$$

$$= \text{the greatest number} - \frac{1}{3} \text{ the distance between the two numbers}$$

Ex 1 Find the number that lies at the midpoint of the way between $\frac{1}{2}$, $\frac{1}{3}$

Solution

$$\frac{1}{2} \quad , \quad \frac{1}{3} \Rightarrow \frac{3}{6} \quad , \quad \frac{2}{6}$$

$$\text{the Sum} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

The number that lies at the midpoint of the way between $\frac{1}{2}$, $\frac{1}{3} = \frac{1}{2}$ sum

$$= \frac{1}{2} \times \frac{5}{6}$$

$$= \frac{5}{12}$$

Ex: Find a rational number lying at one fourth of the way between $\frac{1}{2}$, $\frac{1}{3}$

Solution

$$\frac{1}{2}, \frac{1}{3} \rightarrow \frac{3}{6}, \frac{2}{6}$$

the distance $= \left| \frac{3}{6} - \frac{2}{6} \right| = \frac{1}{6}$

the required number is

the smaller number $+ \frac{1}{4}$ distance

$$= \frac{2}{6} + \frac{1}{4} \times \frac{1}{6}$$

$$= \frac{2}{6} + \frac{1}{24} = \frac{8+1}{24} = \frac{9}{24} = \frac{3}{8}$$

Ex: Find a rational number lying at one fifth of the way between $\frac{2}{5}$ and $\frac{4}{7}$

Solution $\quad \frac{2}{5}, \frac{4}{7} \Rightarrow \frac{14}{35}, \frac{20}{35}$

the distance $= \left| \frac{20}{35} - \frac{14}{35} \right| = \frac{6}{35}$

the required number $=$

the smaller number $+ \frac{1}{5}$ distance

$$= \frac{14}{35} + \frac{1}{5} \times \frac{6}{35} = \frac{14}{35} + \frac{6}{175} = \frac{70+6}{175} = \frac{76}{175}$$